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Journal

of the

# Malayan Branch

of the

# Royal Asiatic Society




July 1926

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CENTRAL ARCHAEOLOGICAL

# The

# Malayan Branch

## of the

## Royal Asiatic Society

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### Patron

H. E. Sir Laurence Guillemard, K.C.B., K.C.M.G., Governor of the Straits Settlements, High Commissioner for the Malay States, British Agent for Sarawak and North Borneo.

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### Council for 1926

| | |
|---|---|
| The Hon. Sir W. George Maxwell, K.B.E., C.M.G. .. .. .. .. .. .. | *President.* |
| The Hon. Mr. Hayes Marriott, C.M.G. .. | *Vice-Presidents for the S. S.* |
| Mr. A. W. Hamilton .. .. .. .. | |
| Mr. J. B. Scrivenor .. .. .. .. | *Vice-Presidents for the F. M. S.* |
| Mr. I. H. N. Evans .. .. .. .. | |
| Mr. R. E. Holttum .. .. .. .. | *Hon. Treasurer.* |
| Mr. C. Boden Kloss .. .. .. .. | *Hon. Secretary.* |
| Dr. F. W. Foxworthy, Messrs. A. F. Richards, J. D. Hall, C. E. Wurtzburg and R. Farrer | *Councillors.* |

Proceedings

of the

# Annual General Meeting

The Annual General Meeting was held in the Society's room in the Raffles Museum, Singapore at 5 p.m. Friday, 26th February 1926.

The Hon. Mr. Hayes Marriott, C.M.G. in the chair.

1. The Minutes of the Annual General Meeting held 27th February 1925 were read and confirmed.

2. The Annual Report and Statement of Accounts for 1925 were adopted.

3. The Officers and Council for the current year were elected (ante p. iii).

4. Twenty-seven new members were elected.

5. The Hon. Secretary stated that though the Annual Report showed a decrease in membership compared with that of 1924 owing to the further operation of Rule 6, a number of gentlemen whose names had been omitted from the list as it stood on January 1st had since paid arrears and resumed membership. He hoped that the next list of members would, for the first time in many years, again be a genuine one.

6. It was agreed, on the initiative of Messrs. Hamilton, Kloss and Wurtzburg, that a statement of the objects and work of the Society, the advantages it offered and an invitation to join should be attached to the form of Application for Membership. The above-named members undertook to distribute the new form and to canvass suitable candidates.

# Annual Report

of the

## Malayan Branch, Royal Asiatic Society

for 1925

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**Membership.** The membership of the Society at the close of the year stood at 546 as compared with 583 at the end of 1924. There were 15 Honorary Members, 3 Corresponding Members and 528 Ordinary Members.

By the strict operation of Rule 6 all those gentlemen who had not paid subscriptions since 1923 were deemed to have resigned membership and their names do not appear in the list of members as on 1st January 1926. Membership can be resumed by payment of arrears.

Forty-four new Members were elected. They are:—

Ahmad, Tungku, D. K.
Banks, E.
Bee, R. J.
Blyth, L. W.
Callenfels, P. V. van Stein
Carey, H. R.
Clegg, R. P.
Corry, W. C. S.
Cullen, E. G.
Davies, D. J.
Fairburn, H.
Fitzgerald, R. D.
Harmer, F. E.
Hay, A. W.
Henderson, L.
Hyde, A.
Jacques, E. W. H.
Jones, A. E. Thornley
Lawes, G. W.
Leonard, R. W. F.
Linehan, W.
Martin, W. M. E.
Miller, G. S.
Mills, G. R.
Milne, C.
Minto, G.
Naidu, Jay Raj.
Onraet, R. H.
Owen, A. T.
Penrice, W.
Pijper, G. F.
Shorland, C. W.
Smith, Dr. E.
Sproule, P. J.
Stark, W. J. K.
Sunn, R. J.
Talalla, B.
Taylor, W. C.
Taylor, W. R.
Thomson, R.
Thurston, J. B. H.
Venables, O. E.
Whitcomb, L. A.
Wilson, C.

**Council.** Several changes took place during the year. Mr. E. S. Hose, C.M.G., retired and was succeeded as a Vice-President for the S. S. by Mr. H. Marriott, C.M.G. On the return from leave in November of Mr. C. Boden Kloss, Mr. C. E. Wurtzburg, M.C. resigned the Hon. Secretaryship and was succeeded by the former. Messrs. W. G. Stirling and F. N. Chasen retired from the Council, and were succeeded by Messrs. C. E. Wurtzburg and R. Farrer. Mr. J. L. Humphreys and Dr. R. O. Winstedt, Vice-Presidents, went on leave in November and December respectively.

**General Meeting.** The Annual General Meeting was held on 27th February at Kuala Lumpur and was followed by a dinner in the Selangor Club at which the chair was taken by the Hon. Dr. R. O. Winstedt. The attendance at the latter was disappointing.

**Journal.** Three journals forming Volume III were printed, but Parts 2 and 3 were received too late to be despatched to Members by the end of the year. Volume III consists of xl and 550 pages, 2 plates and various text figures; and contains twenty-nine articles dealing with Zoology, Botany, Mineralogy, History, Numismatics, Languages, Customs, Beliefs, Magic and Reviews.

A double edition of Part 2, "A History of British Malaya, 1824-1867" with a summary of earlier events, was printed: the Council considered that there would be a large public demand for this number which could not be met from the edition usually prepared for the use of the Society. The Council acknowledges with gratitude the promise of a grant-in-aid of $500 from the Committee for Malay Studies towards the cost of printing Part 2.

At the end of the year the Council was in possession of a number of papers which it had accepted for publication.

**Finances.** Thanks to the generous grants made by the Governments of the Straits Settlements and the Federated Malay States, the financial position of the Society is still very satisfactory. The balance in hand at the end of the year is slightly in excess of that at the beginning, though a considerably increased amount has been spent on printing. The grant from the Government of British North Borneo towards the cost of printing the Dusun Vocabulary published in Vol. II, part 2 (1924) is included in the receipts for 1925.

The increased amount spent on printing is partly accounted for by the fact that four issues of the Journal (one held over from 1924) have been paid for during the year; and partly by the cost of printing the extra edition of Volume III, part 2, much of which it is hoped to recover by sales.

The life members' reserve, invested in Straits Settlements War Loan ($2200) and S. S. and F. M. S. Victory Loan ($2500), remains unchanged, bringing the Society an income of $245 per year.

C. BODEN KLOSS,
*Hon. Secretary.*

## RECEIPTS.

| | | |
|---|---|---|
| tty cash in hand, Jan. 1st, 1925 .. .. | 18.61 | |
| lance at Mercantile Bank, Jan. 1st, 1925 .. | 2,968.88 | |
| | | 2,987.49 |
| bscriptions for the year 1925 .. .. | 1,569.00 | |
| Do for previous years .. .. | 165.00 | |
| Do for future years, in advance | 200.00 | |
| Do life memberships .. .. | 150.00 | |
| | | 2,084.00 |
| S. Government, for the year 1925 .. | 1,000.00 | |
| M. S. Government, for the year 1925 .. | 1,000.00 | |
| itish North Borneo, contribution to cost of printing Dusun Vocabulary .. .. | 600.00 | |
| ıore Government, contribution to cost of paper on Chinese Place Names in Johore | 50.00 | |
| | | 2,650.00 |
| erest on investments .. .. .. | 245.00 | |
| Do on current account .. .. .. | 71,94 | |
| | | 316.94 |
| les of Journals .. .. .. .. | 176.51 | |
| o of Maps .. .. .. .. | 32.07 | |
| | | 208.58 |
| ıner accounts, 1924 and 1925 .. .. | | 29.50 |
| | | $8,276.51 |

## PAYMENTS.

| | | |
|---|---|---|
| PRINTING | | |
| Journal, Volume 2, part 3 .. .. | 838.22 | |
| Volume 3, part 1 .. .. | 843.68 | |
| Volume 3, part 2 .. .. | 2,162.50 | |
| Volume 3, part 3 .. .. | 663.04 | |
| Illustrations .. .. .. | 26.44 | |
| Rules of Society, Circulars, etc. .. | 109.40 | |
| | | 4,643.28 |
| Stationery .. .. .. .. .. | | 32.87 |
| Postage .. .. .. .. .. .. | | 148.58 |
| Salaries .. .. .. .. .. .. | | 408.00 |
| Sundries .. .. .. .. .. | | 30.45 |
| CASH | | |
| Petty cash in hand, Dec. 31st, 1925 .. | 2.81 | |
| Balance at Bank, Dec. 31st, 1925 .. | 3,010.52 | |
| | | 3,013.33 |
| | | $8,276.51 |

R. E. HOLTTUM,
*Hon. Treasurer.*

# List of Members for 1926

(as on 1st January, 1926)

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†Life Members.

## Honorary Members.

| Year of Election. | |
|---|---|
| 1903.1923. | ABBOTT, DR. W. L., North-east Maryland, U. S. A. |
| 1890.1918. | BLAGDEN, DR. C. O., c/o School of Oriental Studies, Finsbury Circus, London. |
| 1921. | BRANDSTETTER, PROF. DR. R., Luzeru, Switzerland. |
| 1894.1906. | COLLYER. W. R., I. S. O., Hackford Hall, Reepham, Norfolk, England. (Council, 1904; Vice-President, 1897-1900, 1902, 1904-1905). |
| 1903.1917. | GALLOWAY, SIR D. J., Singapore. (Vice-President, 1906-1907; President. 1908-1913). |
| 1895.1920. | HANITSCH, DR. R., 99, Woodstock Road, Oxford, England. (Council, 1897-1919; Hon. Treasurer, 1898-1906, 1910-1911, 1914-1919; Hon. Secretary, 1912-1913). |
| 1912. | JOHORE, H. H. THE SULTAN OF, G.C.M.G., K.B.E., Johore Bahru, Johore. |
| 1921. | PERAK, H. H. THE SULTAN OF, K.C.M.G., The Astana Negara, Bukit Chandan, Kuala Kangsar, Perak. |
| 1878. | PERHAM, VEN. ARCHDEACON J., Chard, Somerset, England. |
| 1890.1912. | RIDLEY, H. N., C.M.G., F.R.S., 7 Cumberland Road, Kew Gardens, Surrey, England. (Council, 1890-1894, 1896-1911; Hon. Secretary, 1890-1893, 1896-1911). |
| 1916. | SARAWAK, H. H. THE RAJAH of Kuching, Sarawak. |
| 1885. | SATOW, SIR ERNEST M., Beaumont, Ottery St. Mary, Devon, England. |
| 1894.1921. | SHELLABEAR, REV. DR. W. G., 43 Madison Avenue, Madison, New Jersey, U. S. A. (Council, 1896-1901, 1904; Vice-President, 1913; President, 1914-1918). |
| 1921. | SNOUCK-HURGRONJE, PROF., DR. C., Leiden, Holland. |
| 1921. | VAN RONKEL, DR. P. H., Zoeterwondsche Singel 44, Leiden, Holland. |

## Corresponding Members.

1920. LAIDLAW, DR. F. F., Eastfield, Uffculme, Devon, England.
1920. MERRILL, DR. E. D., University of California, Berkeley, California, U. S. A.
1920. MOQUETTE, J. P., Kebonsirih, 36, Weltevreden, Java.

## Ordinary Members.

1921. †ABDUL AZIS, UNGKU, Johore Bahru, Johore.
1918. ABDUL-MAJID BIN HAJI ZAINUDDIN, HAJI, c/o H. B. M. Consul, Jeddah, Arabia.
ABDUL RAHMAN BIN YANG-DI-PER-TUAN BESAR, TUNGKU, Kuala Kubu, Selangor.
1923. ABDULLAH, DATO SEDIA RAJA, Rembau, Negri Sembilan.
1923. †ABDULLAH BIN JAAFAR, DATO, Tarom, Johore Bahru, Johore.
1916. ABRAHAM, H. C., c/o Topographical Department, Taiping, Perak.
1907. †ADAMS, SIR A., K.B.E., Penang. (Vice-President, 1919).
1921. ADAMS, C. D., Simanggang, Sarawak.
1920. ADAMS, P. M., Kuching, Sarawak.
1917. ADAMS, R. H., c/o Standard Bank of S. Africa Ltd., 10, Clements Lane, London.
1909. ADAMS, T. S., Taiping, Perak.
1919. †ADELBORG, F., Pelepah Valley Rubber Estates, Kota Tinggi, Johore.
1925. AHMAD, H. H. TUNGKU, Istana Marble, Johore Bahru.
1923. AHMAD BIN ANDAH, Inche, Johore Bahru, Johore.
1921. AHMAD JALALUDDIN, Inche, Malay College, Kuala Kangsar, Perak.
1922. ALEXANDER, C. S., Kuala Lumpur, Selangor.
1924. ALEXANDER, J. A., c/o Evatt & Co., Kuala Lumpur, Selangor.
1913. ALLEN, REV. G. DEXTER, Windermere, St. Thomas Walk, Singapore.
1914 ALLEN, H. C. W., Boustead & Co., Ltd., Singapore.
1921. ALLEN, L. A., Secretariat, Kuala Lumpur, Selangor.
1921. ALLEN, W. H. R., Straits Trading Co., Ltd., Penang.
1921. ANDREINI, CAPT. E. V., Kuching, Sarawak.
1908. ARTHUR, J. S. W., Penang.
1923. ASTON, A. V., Bukit Mertajam, Province Wellesley.
1921. AUSTIN, K. W. H., c/o Police Office, Penang.
1908. †AYRE, C. F. C., Ipoh, Perak.
1915. BADDELEY, F. M., Lagos, Nigeria, West Africa.
1919. †BAILEY, A. E., Mountmillan, Knowles Hill, Newton Abbott, England.
1923. BAILEY, A. S., Kuala Lumpur, Selangor.
1915. BAIN, N. K., Kuala Kangsar, Perak.
1921. †BALL, H., Department of Education, Singapore.

1925. BANKS, E., Sarawak Museum, Kuching, Sarawak.
1916. BANKS, H. H., Sanitary Board, Seremban, Negri Sembilan.
1899. †BANKS, J. E. c/o The American Bridge Co., Cambridge, Pa., U. S. A.
1920. BARBOUR, DR. T., Museum of Comparative Zoology, Harvard University, Cambridge, Mass., U.S.A.
1921. BARNES, J. R., Kuching, Sarawak.
1923. BARRON, J. M., Town Planning Dept., Kuala Lumpur, Selangor.
1923. BATHURST, H. C., Batu Gajah, Perak.
1914. BAZELL, C., Malay College, Kuala Kangsar, Perak. (Hon. Librarian, 1916-1920; Hon. Treasurer, 1921-1922).
1923. †BEAMISH, C. N. B., Education Dpeartment, Kuala Lumpur, Selangor.
1921. BEARD, H., c/o The Asiatic Petroleum Co., Ltd., Miri, Sarawak.
1923. BECKER, F. E., Wessyngton Estate, Rengam, Johore.
1925. BEE, R. J., c/o F. M. S. Railways, Kelantan.
1921. BELGRAVE. W. N. C., Department of Agriculture, Kuala Lumpur, Selangor.
1913. BELL, V. G., Forest Department, Kuala Lumpur, Selangor.
1921. BENJAMIN, MAJOR E. V., Asiatic Petroleum Co., Ltd., Miri, Sarawak.
1910. †BERKELEY, CAPT. H., I.S.O., Grik, Perak.
1912. BICKNELL, J. W., U. S. Rubber Plantation, Penang.
1884. BICKNELL, W. A., 2 Phillips Avenue, Exmouth, Devon, England.
1922. BIGGS, L. A. C., Municipal Office, Penang.
1924. BIRD, R., District Officer, Kuala Pilah, Pahang.
1908. †BISHOP, MAJOR C. F., R. A.
1922. BISHOP, D. A., Raffles Institution, Singapore.
1923. BLACK, J. A., Chinese Protectorate, Seremban, Negri Sembilan.
1923. BLACK, J. G., Colonial Secretary's Office, Singapore.
1921. BLACK, DR. K., Tan Tock Seng's Hospital, Singapore.
1923. †BLACKER, G. O., 121, Princess Street, Manchester, England.
1884. BLAND, R. N., C.M.G., 25, Earl's Court Square, S.W. 5., London (Council, 1898-1900; Vice-President 1907-1909).
1921. BLASDELL, REV. R., Anglo-Chinese School, Ipoh, Perak.
1925. BLYTHE, W. L.
1923. BOOTHBY, J. V., Kudat, British North Borneo.

1910. Boult, F. F., Limbang, Sarawak.
1919. †Bourne, F. G., Singapore.
1921. Boyd, R., Co-operative Societies Department, Penang.
1924. Boyd. R. M. c/o Java Bank, Pontianak, Borneo.
1919. †Boyd, W. R., District Office, Krian, Perak.
1913. Braddell, R. St. J., c/o Braddell Brothers, Singapore.
1923. Bresland, C. W.
1897. Brockman, Sir E. L., K.C.M.G., 88 Cannon Street, London.
1909. Brooks, C. J., Church Gate House, Woolpit, Suffolk, England.
1909. Brown, A. V., Penang.
1915. Brown, C. C., Kota Bharu, Kelantan. (Vice-President, 1925).
1910. Brown, D. A. M., c/o Brown Phillips and Stewart, Penang.
1921. Browne, T. W., St., Hilier Estate, Bahau, Negri Sembilan.
1913. †Bryan, J. M., c/o The Borneo Co., Ltd., 28 Fenchurch Street, London.
1887. Bryant, A. T., The Moorings, Falmouth, Cornwall, England. (Council, 1907-1910; Vice-President, 1912, 1914-1916).
1912. Burkill, I. H., The Camp, Lake Bookham, Surrey, England. (Council, 1913, 1921-1923; Hon. Secretary, 1914-1917; Vice-President, 1924).
1921. Butterfield, H. M., Alor Star, Kedah.
1913. †Caldecott, A., C.B.E., Ipoh, Perak.
1925. Callenfels, Dr. P. Van Stein, Inspector van den Oudheid Pundiging Dienst, Wonosobo, Java.
1916. Campbell, Prof. J. A., National Institute for Medical Research, Hampstead, London. (Council, 1917, 1919).
1923. Campbell, J. W., Malacca.
1925. Carey, H. R., Malay College, Kuala Kangsar, Perak.
1918. Carpmael, H., Municipality, Singapore.
1924. Carr, C. E., Alor Gajah, Malacca.
1924. Caseley, J. D., 2 St. Thomas Walk, Singapore.
1921. †Cavendish, A., Kuala Lumpur, Selangor.
1906. Chapman, W. T., Chinese Protectorate, Kuala Lumpur, Selangor.
1921. Chasen, F. N., Raffles Museum, Singapore. (Council, 1925).
1924. †Cheeseman, H. R., Education Department, Penang.
1913. †Choo Kia Peng, Kuala Lumpur, Selangor.
1913. Chulan, Raja, Di Hilir, The Hon., Kuala Kangsar, Perak.
1923. Churchill, W. F. N., Kuala Kangsar, Perak.

1921. CLARK, H. T., Education Office, Singapore.
1924. CLARKE, W. B., M.C., Education Department, Singapore.
1923. CLARKSON, H. T., Raffles Hotel, Singapore.
1911. †CLAYTON, T. W., Johore Bahru, Johore.
1925. CLEGG, R. P., Land Officer, Kuala Lumpur, Selangor.
1917. CLIFFORD, G. F. W., Lawas (Sarawak) Rubber Estates Ltd., Lawas, Labuan.
1923. COBBE, F., Raffles Institution, Singapore.
1922. COCHRANE, C. W. H., Federal Secretariat, Kuala Lumpur, Selangor.
1922. COE, CAPT. T. P., M.C, Tapah, Perak.
1920. †COLLENETTE, C. L., Gottic Lodge, Woodford Green. Essex, England. (Council, 1922).
1897. †CONLAY, W. L., 88 Cannon Street, London.
1899. COOK, REV. J. A. B.
1923. COOKSON, W. S., Seldings Estate, Selama, Perak.
1925. CORRY, W. C. S., Cadets Bungalow, Upper Wilkie Road, Singapore.
1920. COTTERILL, W. S., Miri, Sarawak.
1921. COULSON, N., District Office, Raub, Pahang.
1924. COVENTRY, MAJOR C. H., Fort Canning, Singapore.
1921. COWAP, J. C., Government Analyst's Office, Singapore.
1923. †COWGILL, J. V., Kemaman.
1921. CRANNA, GORDON, Y. M. C. A., Singapore.
1917. CRICHTON, R., Klang, Selangor.
1921. CROCKER, H. B., Kuching, Sarawak.
1922. CROSS, A. B., Seremban, Negri Sembilan.
1921. †CULLEN, W. G., c/o Price Waterhouse & Co., Aguiar 71, Havana, Cuba.
1925. CULLIN, E. G., P. W. D., Dindings.
1923. CURTIS, R. J. F., District Office, Nibong Tibal, Province Wellesley.
1922. DALTON, H. G., Subur Rubber Estates, Krian Road, Perak.
1923. DALTON, N. D., Gadek Estate, Tampin. F. M. S.
1910. †DALY, M. D., Alor Star, Kedah.
1924. DATO MUDA ORANG KAYA MENTRI, Taiping, Perak.
1924. DATO MUDA ORANG KAYA KAYA PANGLIMA, KINTA, Police Depot, Kuala Lumpur.
1918. †DAVID, P. A. F., Singapore.
1925. DAVIES, D. J., Sungei Purun Estate, Semenyih. Selangor.
1923. DAY, E. V. G., Alor Star, Kedah.
1924. DENHAM, G. C., C.I.E., C.B.E., Soebang, Batavia, Java.
1922. DENNY, A., Sungei Pelek Estate, Sepang, Selangor.
1903. †DESHON, H. F.

1897. DICKSON, E. A., Batu Gajah, Perak.
1921. †DICKSON, P. L., Western House, The Nash, Nottingham, England.
1920. DODDS, H. B., General Hospital, Penang.
1923. †DOSCAS, A. E. COLMAN, Department of Agriculture, Kuala Lumpur, Selangor.
1922. DRURY, CAPT. F., Bukit Zahara School, Johore Bahru, Johore.
1921. DRYBURGH, A. M., Kuala Krai, Kelantan.
1910. DUNMAN, W., Grove Estate, Grove Road, Singapore,
1915. †DUSSEK, O. T., Sultan Idris Training College, Tanjong Malim, Perak.
1922. EBDEN, W. S., Segamat, Johore.
1922. ECKHARDT, H. C., Alor Star, Kedah.
1922. EDGAR. A. T., Suffolk Estate, Sitiawan, F. M. S.
1885. EGERTON, SIR WALTER, K.C.M.G., Fir Toll, Mayfield, Sussex, England.
1921. ELDER, DR. E. A., 4 Battery Road, Singapore.
1924. ELDRIDGE, CAPT. E. J. M., c/o Straits Steamship Co., Ltd., Malacca.
1922. ELLES, B. W., Department of Agriculture, Kuala Lumpur, Selangor.
1918. ELLIOTT, F. M., Treskelly, Maruhull, Dorset, England.
1924. ELSTER, C., Kuala Han Estate, Kelantan.
1913. ERMEN, C., Kuching, Sarawak.
1923. †EU TONG SEN, O.B.E., Sophia Road, Singapore.
1924. EVANS. I. H. N., Museum, Kuala Lumpur, Selangor.
1925. FAIRBURN, H., Stevens Road, Singapore.
1910. FALSHAW, P. S., 18 The Crescent, Tanjong Katong, Singapore.
1909. FARRER. R. J., Municipality, Singapore. (Council, 1925.)
1910. †FERGUSON-DAVIE, RT. REV., C. J., Bishop of Singapore. (Council, 1912-1913).
1909. FERRIER, J. C., 28 Fenchurch Street, London.
1917. FINLAYSON, G. A., General Hospital, Singapore.
1919. †FINNIE, W., Mintlaw Station, Aberdeen, Scotland.
1910. FIRMSTONE, H. W., Sentosa, Ripple, Dover, England. (Council, 1918-1919; Vice-President, 1920).
1925. FITZGERALD, DR. R. D., Johore Bahru, Johore.
1924. FLEMING, E. D., Taiping, Perak.
1897. †FLOWER, MAJOR S. S., Spencersgreen, Tring, Herts, England.
FOREST BOTANIST, Forest Research Institute, Dehra Dun, U. P., India.
1921. FORRER, H. A., Supreme Court, Ipoh, Perak.
1918. FOXWORTHY, DR. F. W., Forest Department, Kuala Lumpur, Selangor. (Council, 1923).

1921. †Fraser, F. W., C.B.E., Jesselton, British North Borneo.
1922. Fraser, H. J., Fraser & Co., Kuala Lumpur, Selangor.
1908. Freeman, D., Kuala Lumpur, Selangor.
1910. †Frost, Meadows, Johore Bahru, Johore.
1924. Fry, R. M., F. M. S., Police Headquarters, Kuala Lumpur, Selangor.
1922. Fuller, J. C., c/o The Engineer's Club, 39 Coventry Street, London.
1923. Fulton, George R.
1912. †Gallagher, W. J., U. S. Plantation Inc., Medan, Sumatra.
1924. Gammans, L. D.
1923. Gan Khek Keng, 26 Oxley Rise, Singapore.
1917. †Garnier, Rev. Keppel, Penang.
1923. Gater, B. A. R., Department of Agriculture, Kuala Lumpur, Selangor.
1920. Geale, Dr. W. J., Kelantan.
1917. †Gerini, Lt. Col. G. C.
1924. Gibson, A. Malay Mail Office, Kuala Lumpur, Selangor.
1921. Gibson, L. B., c/o Attorney-General's Office, Singapore.
1903. Gibson, W. S., Kuala Lumpur, Selangor.
1923. Gilman, E. W. F., Kuala Lumpur, Selangor.
1923. Gilmour, A., Labour Office, Malacca.
1902. †Gimlette, Dr. J. D., Hillside, Upper Weston, Bath, Somerset, England.
1922. †Glass, Dr. G. S., Municipal Offices, Penang.
1918. Glayne, G. B., c/o Burt Myrtle & Co., Batavia, Java.
1916. Goodman, A. M., Chinese Protectorate, Ipoh, Perak.
1922. Gordon, T. I. M., c/o General Post Office, Singapore.
1920. Gordon-Hall. Capt. W. A., Kuala Langat, Selangor.
1909. Goulding, R. R., Survey Department, Johore Bahru, Johore.
1919. Gow, G. Aubrey, Lebong Tandai, Benkoelen, Sumatra.
1924. Graham, W. H., Malacca.
1923. Green, Dr. P. Witners, Johore Bahru, Johore.
1924. Greig, G. E., Kuala Lumpur, Selangor.
1923. Grieve, C. J. K., Seremban, Negri Sembilan.
1921. Griffiths, C. S., Sibu, Sarawak.
1911. Grist, D. H., Department of Agriculture, Kuala Lumpur, Selangor.
1922. Gubbins, W. H. W., Seremban, Negri Sembilan.
1921. Guillemard, Sir L. N., K.C.B., K.C.M.G., Government House, Singapore, (Patron, 1921).

1925. GUNN, R. F., Education Department, Kuala Lumpur, Selangor.
1916. GUPTA, SHIVA PRASAD, Naudansahu Street, Benares City, India.
1923. †HACKER, DR. H. P., University College, W.C.I., London.
1923. HAINES, MAJOR O. B., S. O. S. Estate, Selama, Perak.
1923. HAKE, H. B. EGMONT, Barker & Co., Ltd., Kuala Lumpur, Selangor.
1923. HALFORD, SIDNEY, F. M. S., Railways, Kuala Lumpur, Selangor.
1922. HALL, A. C., Ocean Corporation Ltd., Singapore.
1914. HALL, J. D., Government Domain, Singapore. (Council, 1924).
1911. †HALLIFAX, F. J., Oakwood, Brampton, Cumberland, England.
1915. HAMILTON, A. W., Political Intelligence Bureau, Singapore. (Vice-President, 1922, 1925).
1918. HAMPSHIRE, A. K. E., Kuala Lumpur, Selangor.
1922. HAMPSHIRE, D. H., c/o Boustead & Co., Ltd., Kuala Lumpur, Selangor.
1924. HAMZAH BIN ABDULLAH, INCHE, Temerloh, Pahang.
1922. HANITSCH, P. H. V., P. W. D., Alor Star, Kedah.
1921. HARDIE, J. A. H., Kuching, Sarawak.
1925. HARMER, F. E., Butterworth, Province Wellesley.
1909. HARRINGTON, A. G., Municipality, Singapore.
1922. HARRISON, C. W., Kuala Lumpur, Selangor.
1922. HARROWER, G., Medical College, Singapore.
1921. HART, DR. H. H., 314 Locust Street, San Francisco, U. S. A.
1925. HARMER, F. C., Butterworth, Province Wellesley.
1921. HASHIM, CAPT. N. M., Parit Buntar, Perak.
1921. HAWKINS, G., Secretariat, Kuala Lumpur, Selangor.
1925. HAY, A. W., Chinese Protectorate, Singapore.
1919. HAY, M. C., Kuala Lumpur, Selangor.
1921. HAYES, I. J., c/o Fraser & Co., Singapore.
1904. †HAYNES, A. S., Alor Star, Kedah. (Council, 1920).
1922. HELLINGS, G. S., Johore Bahru, Johore.
1923. HEMMANT, G., Singapore.
1925. HENDERSON, L., Sultan Idris Training College, Tanjong Malim, Perak.
1921. HENDERSON. M. R., Botanic Gardens, Singapore.
1923. HENGGELER, A. A., Kuala Lumpur, Selangor.
1917. HEREFORD, G. A., Penang,
1921. HEWETSON, C., c/o Lyall & Evatt, Singapore.
1923. †HICKS, E. C., Education Department, Alor Star, Kedah.
1878. HILL, E. C., 26 Highfield Hill, Upper Norwood, London.

1922. HILL, W. C., Singapore Oil Mills Ltd., Havelock Road, Singapore.
1922. HINDE, C. T., Mersing, Johore.
1923. †HODGSON, D. H., Forest Department, Kuala Lumpur, Selangor.
1921. HOLGATE, M. R., c/o Education Department, Malacca.
1923. HOLLAND, A. D., Kapoewas Rubber Co., Ltd., Sungei Dekan, Pontianak, Borneo.
1922. HOLTTUM, R. E., Botanic Gardens, Singapore. (Hon. Treasurer, 1923).
1921. HOOPS, DR. A. L., Singapore.
1917. †HOSE, DR. CHARLES, Redleaf, Riddledown Road, Purley, Surrey, England.
1897. HOSE, E. S., C.M.G. (Vice-President, 1923, 1925; President, 1924).
1923. HOWL, CAPT. F. W., F. M. S. Railways, Kuala Lumpur, Selangor.
1891. HOYNCK, VAN PAPENDRECHT, P. C., Le Tanglin, Avenue Trespoey, Pau, Basses Pyrenees, France.
1909. HUBBACK, T. R., Kuala Lipis, Pahang.
1922. HUGGINS, CAPT. J., Singapore.
1909. HUGHES, J. W. W.
1907. HUMPHREYS, J. L., (Vice-President, 1922-1925).
1922. HUNT, CAPT. H. NORTH, Telok Anson, Perak.
1921. HUNTER. DR. P. S., Municipality, Singapore.
1925. HYDE, A., District Office, Alor Gajah, Malacca.
1922. IRVINE, CAPT. R., M. C., Teluk Anson, Perak.
1921. ISMAIL BIN BACHOK, DATO, Johore Bahru, Johore.
1921. IVENS, F. B.. c/o Bannon & Bailey, Kuala Lumpur, Selangor.
1921. †IVERY, F. E., Alor Star, Kedah.
1925. JACQUES, E. W. H., Sibu, Sarawak.
1921. JACQUES, DR. F. V., Ipoh, Perak.
1922. JAGO, E., Klang, Selangor.
1918. †JAMES, D., Goebilt, Sarawak.
1918. JANSEN, P. T., Lebong Tandai, Post Ketaun, Benkoelen, Sumatra.
1924. JANTAN OMAR, Inche, Jesselton, British North Borneo.
1911. JELF, A. S., Kingston, Jamaica.
1921. †JERMYN, L. A. S., Government English School, Batu Pahat, Johore.
1910. JOHNSON, B. G. H., c/o Boustead & Co., Kuala Lumpur.
1920. JOHNSTON, J., Raffles Library, Singapore. (Hon. Librarian, 1921-1923; Council, 1924).
1925. JONES, A. E. THORNLEY, c/o Mansfield & Co., Singapore.

1918. †JONES, E. P., 20 Waterbell Street, Rye, Sussex, England.
1913. JONES, S. W., Federal Secretariat, Kuala Lumpur, Selangor.
1919. †JORDAN, A. B., Chinese Protectorate, Kuala Lumpur, Selangor.
1921. JOY, M. M., c/o Asiatic Petroleum Co., Ltd., Miri, Sarawak.
1921. KASSIM IBNI SULTAN ABDUL HAMID HALIMSHAH, TUNGKU, Alor Star, Kedah.
1921. †KAY-MOUAT, DR. J. R., Medical College, Singapore.
1921. †KELLIE, J., Padang Tungku, Pahang.
1924. KEMP, T. F. H., F. M. S. Police, Kuala Lumpur, Selangor.
1913. KEMPE, J. E., Trengganu.
1922. †KER, W. P. W., c/o Paterson Simons & Co., Singapore.
1920. †KERR, DR. A. F. G., Bangkok, Siam.
1921. KIDD, G. M., Kuala Lumpur, Selangor.
1916. KINSEY, W. E., Forest House, Seremban, Negri Sembilan.
1921. KITCHING, T., Survey Department, Kuala Lumpur, Selangor.
1900. KLOSS, C. BODEN, Raffles Museum, Singapore. (Council, 1904-1908, 1923; Vice-President, 1920-1921; Hon. Secretary, 1923).
1915. KNIGHT, V., Fairgreen Cottage, Glemsford, Suffolk, England. (Hon. Treasurer, 1920).
1922. KRAEMER, DR. H., Rampal 53, Malang, Java.
1924. LAMBOURNE, J., Government Plantations, Kuala Lumpur, Selangor.
1925. LAWES, G. W., Police Headquarters, Kuala Lumpur, Selangor.
1923. †LEASE, F. E., Sapong Estate, Tenom, British North Borneo.
1921. †LEE, L. G., Labu Estate, British North Borneo.
1922. LEECH, R. F. V., Tapah, Perak.
1920. LEE-WARNER, W. H.
1922. †LEGGATE, J., Prai, Province Wellesley.
1913. LEICESTER, DR. W. S., Kuantan, Pahang.
1894. †LEMON, A. H., C.M.G., c/o Crown Agents, 4 Millbank, London. (Vice-President, 1916-1918).
1920. LENDRICK, J., Norre Alle 30, Aarhus, Denmark.
1925. †LEONARD, R. W. F., c/o Mansfield & Co., Singapore.
1890. LEWIS, J. E. A., Harada 698, Kobe, Japan.
1922. LEYNE, E. G., Sungei Purun Estate, Semenyih, Selangor.
1915. LIM CHENG LAW, Millview, Penang.
1925. LINEHAN, W., Pekan, Pahang.
1924. LITTLE, MAJOR W. B.

1924. LOCK, J. T., Cocos Island.
1918. LOH KONG IMM, Sepang-Tanah Merah Estate, Sepang, Selangor.
1914. LORNIE, J.
1922. LOWINGER, V. A., Survey Department, Kuala Lumpur, Selangor.
1907. †LYONS, REV. E. S., c/o Methodist Publishing House, Manila, P. I.
1918. MACALISTER, DR. G. H. K., Medical College, Singapore. (Cuncil, 1920, 1922-23).
1920. †MACBRYAN, G. T. M., Raffles Hotel, Singapore.
1910. MACFADYEN, E., c/o Sports Club, London.
1920. MACKIE, VIVIAN, Kuala Lumpur, Selangor.
1922. MACKNESS, L. R., Kuala Lumpur, Selangor.
1921. MACMILLAN, I. C., Alor Star, Kedah.
1921. MADGE, E. E., Box 197, Turkish Post Office, Galata, Constantinople.
1918. MADGE, RAYMOND, Kuala Lumpur, Selangor.
1924. MAHMUD BIN MAT, INCHE, District Office, Kuala Lipis, Pahang.
1923. MAHMUD BIN MOHD. SHAH, INCHE, Johore Bahru, Johore.
1903. MAKEPEACE, W., c/o Singapore Free Press Office, Singapore. (Council, 1914, 1916, 1920; Hon. Librarian, 1909-1912; Vice-President, 1917; Hon. Secretary, 1918-1919).
1921. MANCHESTER, H. L., Municipality, Singapore.
1922. MANN, G. E., Kuala Lumpur, Selangor.
1916. MANN, W. E., c/o Burt Myrtle & Co., Batavia, Java.
1922. MANSFIELD, J. T., Cable Depot. Keppel Harbour, Singapore.
1907. †MARRINER, J. T., Kuantan, Pahang.
1902. MARRIOTT, H., C.M.G., Singapore. (Council, 1907-8, 1910-13, 1915-18; Vice-President, 1919, 1923, 1925).
1920. MARSH, W., Municipality, Singapore.
1909. MARSHALL, H. B., Felbridge, East Grimstead, Sussex, England.
1925. †MARTIN, W. M. E., District Forest Officer, Tampin, F. M. S.
1923. MARTYN, C. D., Jesselton, British North Borneo.
1921. MATHER, N. F., Seremban, Negri Sembilan.
1924. MATTHEWS, REV. J. B., Madison, New Jersey, U. S. A.
1921. MAXWELL, C. N., Kuala Lumpur, Selangor.
1903. MAXWELL, SIR W. G., K.B.E., C.M.G., Carcosa, Kuala Lumpur, Selangor. (Council, 1905, 1915; Vice-President, 1911-12, 1916, 1918, 1920; President, 1919, 1922-23, 1925).

1922. MAY, P. W.
1909. MCARTHUR, M. S. H., c/o Crown Agents, 4 Millbank, London.
1920. MCCABE, DR. J. B., Kapoewas Rubber Estate, Soengei Dekan, Pontianak, Borneo.
1922. MCCLELLAND, F. A. S., c/o Sports Club, St. James Square, London.
1923. MCKERRON, P. A. B., Trengganu.
1910. MCLEAN, L., Treasury, Singapore.
1921. MCLEOD, D., King Edward's School, Taiping, Perak.
1914. MEAD, J. P., Kuching, Sarawak.
1924. MEADE, J. M., Teluk Anson, Perak.
1920. MILLAR, G. W. R., Port Dickson, Negri Sembilan.
1925. MILLER, G. S., c/o Mansfield & Co., Penang.
1921. †MILLER, J. I., Johore Bahru, Johore.
1925. MILLS, G. R., Kinta Kellas Estate, Batu Gajah, Perak.
1921. MILLS, COMMANDER, J. F., R.N., I.S.O.
1924. MILLS, L. L., Johore Bahru, Johore.
1925. MILNE, CHARLES, Lendu Estate, Alor Gajah, Malacca.
1925. MINTO, GEORGE, British American Tobacco Co., Kuala Lumpur, Selangor.
1919. MISSIONARY RESEARCH LIBRARY, 25 Madison Avenue, New York City, U. S. A.
1922. MOHAMED ISMAIL MERICAN BIN VAFOO MERICAN NOORDIN, Legal Adviser's Office, Alor Star, Kedah.
1922. MOHAMED SAID, CAPT., HADJI, Bukit Timbalan, Johore Bahru.
1921. MOHAMED SALLEH BIN ALI, DATO, Johore Bahru, Johore.
1921. MOHAMED SHERIFF BIN OSMAN, Inche, Alor Star, Kedah.
1920. MONK, H. F.
1921. MORGAN, S., c/o Wilde & Co., Ltd., 12 Market Street, Kuala Lumpur, Selangor.
1920. †MORKILL, A. G., District Office, Tampin, Malacca.
1924. MORRIS, L. A. G., F. M. S. Police, Kuala Lumpur, Selangor.
1923. MORTEN, F. J., c/o Colonial Secretariat, Singapore.
1909. †MOULTON, DR. J. C., M.B.E., Kuching, Sarawak. (Council. 1916-19; Hon. Secretary, 1920-23).
1920. MOWBRAY, G. A. de C., Kuala Lumpur, Selangor.
1915. †MUNDELL, H. D., c/o Sisson & Delay, Singapore.
1913. MURRAY, REV. W.
1921. NAGALINGAM, C. R., Anglo-Chinese School, Telok Anson, Perak.

1917. Nagle, Rev. J. S., 2732 N. Calvert Street, Baltimore, U. S. A.
1925. Naidu, Jay Raj, 142 Race Course Road, Singapore.
1922. Nash, G. H., Kuala Lipis, Pahang.
1921. Neilson, Major J. B., Education Department, Alor Star, Kedah.
1923. Nicholson, J. E. H., c/o Eastern Extension Tel. Co. Labuan, Borneo.
1923. Nixon, H. E., Devon Estate, Malacca.
1900. Norman, Henry.
1906. Nunn, B., Municipal Offices, Penang. (Council, 1922).
1911. O'May, J., c/o Harrisons & Crosfield Ltd., 1-4 Great Tower Street, London.
1916. Ong Boon Tat, 37 Robinson Road, Singapore.
1925. Onraet, R. H., Chief Police Office, Singapore.
1923. Opie, R. S., Box 140, Kuala Lumpur, Selangor.
1921. Orchard, H. A. L., Chinese Free School, Cecil Street, Singapore.
1920. O'Sullivan, T. A., Education Office, Penang.
1913. Overbeck, H., c/o Behn Meyer & Co., Ltd., Sourabaya, Java.
1925. Owen, A. T., Kuala Pergam, Kelantan.
1922. Page-Turner, F. W., Simanggang, Sarawak.
1919. Park, Mungo, P.O. Delivery 19, Kuala Lumpur.
1921. Parnell, E., Kuching, Sarawak.
1908. †Parr, C. W. C., C. M. G. (Vice-President, 1919).
1922. Pasqual. J. C., Perlis, Kedah.
1921. †Paterson, Major H. S., Kuala Lumpur.
1921. Peach, Rev. P. L., 4 Mount Sophia, Singapore.
1921. Pedlow, J., Penang.
1922. Peel, W., C.M.G., Kuala Lumpur.
1921. †Pendlebury, H. M., Museum, Kuala Lumpur, Selangor.
1924. Pennefather-Evans, J. P., F. M. S. Police, Kuala Lumpur, Selangor.
1925. †Penrice, W., c/o Mansfield & Co., Ltd., Singapore.
1914. Pepys, W. E., Kuala Lumpur, Selangor.
1920. Perkins, C. J., Survey Department, Kuala Lumpur Selangor.
1920. Peskett, A. D., African Direct Telegraph Co., Freetown, Sierra Leone, Africa.
1920. Peters, E. V., Bundi, Kemaman, Trengganu.
1925. Pijper, Dr. G. F., Kramat 61, Weltevreden, Java.
1921. †Plummer, W. P., The Observatory, Bidston, Birkenhead, England.
1910. Pratt, Capt. E., Butterworth, Province Wellesley.

1924. PURCELL, V. W. W. S., Chinese Protectorate, Penang.
1906. PYKETT, REV. G. F., M. E. Mission, Penang.
1924. RAJA BENDAHARA PERAK, Kuala Kangsar, Perak.
1924. RAJA KECHIL TENGAH, Taiping, Perak.
1920. RAJA MAHMUD BIN RAJA ALI, Department of Agriculture, Kuala Lumpur.
1924. RAJA MUDA PERAK, H. H., Telok Anson, Perak.
1924. RAJA MUSA BIN RAJA BOT, Kajang, Selangor.
1924. RAJA OMAR BIN RAJA ALI, Court House, Ipoh, Perak.
1924. RAJA SALIM BIN MOHD. YUSUF, Selama, Perak.
1924. RAMBAUT, A. E., Forest Department, Kuala Lumpur, Selangor.
1924. RASMUSSEN, H. C., c/o East Asiatic Co., Singapore.
1917. RATTRAY, DR. M. J., c/o Europe Hotel, Singapore,
1916. RAYMAN, L., c/o Supreme Court, Kuala Lumpur, Selangor.
1923. READE, C. C., Kuala Lumpur, Selangor.
1924. REED, J. G., c/o Union Bank of Scotland, 62 Cornhill, London.
1910. †REID, DR. ALFRED, Kuala Lumpur, Selangor.
1921. †REX, MARCUS, Kuala Lumpur, Selangor.
1915. RICHARDS, A. F., High Commissioner's Office, Singapore. (Council, 1923).
1923. RIDOUT, F. G., c/o Harbour Board, Singapore.
1918. RITCHIE, C., Reko Hill, Kajang, Selangor.
1912. ROBERTSON, J., The Arcade, Singapore.
1911. †ROBINSON, H., c/o Swan & Maclaren, Singapore (Council, 1916-1920; Vice-President, 1922-1923).
1904. ROBINSON, H. C., c/o Lloyds Bank, (Cox & King's Branch), Pall Mall, London. (Vice-President, 1909, 1913, 1922-23; Council, 1920).
1923. ROBSON, J. M., Malay Mail Office, Kuala Lumpur, Selangor.
1916. ROGERS, A., Penang.
1924. ROOKE, C. E., Kota Bharu, Kelantan.
1921. ROSS, E. A., Labour Office, Penang.
1924. ROWE, A. S., Paper, British North Borneo.
1917. †ROWLAND. W. R.,
1922. RUSSELL, D. J. A., Kuala Lumpur, Selangor.
1921. RUSTON, J. A. V., c/o Maclean, Watson & Co., Batavia, Java.
1924. RYVES, R. W., Senawang Estate, Sungei Gadut, Negri Sembilan.
1922. SAID MOHAMED IDID BIN SAID ALI IDID, HADJI, Alor Star, Kedah.
1924. SAMAH BIN HAJI ALI, INCHE, Pekan, Pahang.
1921. SANGUINETTI, MAJOR W. R., O.B.E., Alor Star, Kedah.

1923. SANMUGAM. S. V., Court Interpreter, Johore Bahru, Johore.
1923. †SANSOM, C. H., Police Headquarters, Kuala Lumpur, Selangor.
1919. †SANTRY, D., c/o Swan & Maclaren, Singapore.
1896. †SAUNDERS. C. J., Glade House, Tadworth, Surrey, England. (Vice-President, 1910-11, 1914-15; President, 1916-18).
1923. SAVAGE, H. E., Trengganu.
1921. SCHIDER, DR. R., P. O. Box 12, Miri, Sarawak.
1910. SCOTT, R., Malacca.
1920. †SCOTT, DR. WAUGH, Sungei Siput, Perak.
1906. SCRIVENOR, J. B., Batu Gajah, Perak. (Vice-President, 1922, 1924).
1915. †SEE TIONG WAH, Balmoral Road, Singapore.
1922. SEHESTED, S., Chartered Bank, Penang.
1923. SHEARN, E. D., c/o Pooley & Co., Klyne Street, Kuala Lumpur.
1923. SHEIKH ABDULLAH BIN YAHYA, LT., Johore Bahru, Johore.
1925. SHELLEY, M. B., Education Department, Singapore.
1925. SHORLAND, C. W., Labour Office, Kuala Lumpur, Selangor.
1924. SIME, F. D., Bukit Lintang Estate, Malacca.
1921. SIMPSON, P., c/o Presgrave & Mathews, Penang.
1909. †SIMS, W. A.. c/o Commercial Union Assurance Co., Ltd., Singapore.
1921. SIRCOM, H. S., Kuala Lumpur, Selangor.
1921. SKRINE, W. F. DE V., Mukah, Sarawak.
1922. SMALL, A. S., c/o Treasury, Singapore.
1922. SMART, DR. A. G. H., Alor Star, Kedah.
1924. SMEDLEY, N., c/o Raffles Museum, Singapore.
1925. SMITH, DR. E., Lane End, Putney Heath Lane, London.
1921. SMITH, DR., G. T. F., c/o Asiatic Petroleum Co., Ltd., Miri, Sarawak.
1912. SMITH, PROF. HARRISON W., Massachusetts Institution of Technology, Boston, Mass., U. S. A.
1924. SMITH, J. D. M., Taiping, Perak.
1921. SMITH, CAPT. S. R., Kuala Lumpur.
1924. SMITH, W. MAXWELL, Temerloh, Pahang.
1920. SOH YIEW JIN, 119 Devonshire Road, Singapore.
1910. SONG ONG SIANG, c/o Aitken and Ong Siang, Singapore.
1921. SOUTH, F. W., Department of Agriculture, Kuala Lumpur, Selangor.
1921. SPEERS, W. E., Alor Star, Kedah.
1925. SPROULE, P. J.
1918. STANTON, DR. A. T., Kuala Lumpur, Selangor.
1925. STARK, W. J. K.

1910. STEEDMAN, R. S., Rahman Hydraulic Tin, Intan, Perak.
1920. STEVENS, F. G., c/o Rodyk & Davidson, Singapore.
1910. †STILL, A. W., c/o Straits Times Office, Singapore. (Council, 1914-15).
1917. †STIRLING, W. G., c/o Chinese Protectorate, Singapore. (Council, 1923-25).
1922. STONOR, O. F., Kuala Lumpur, Selangor.
1921. STOOKE, G. BERESFORD, c/o The Secretariat, Nairobi, Kenya, East Africa.
1921. STOWELL, DE LA M., Free School, Penang.
1911. STUART, E. A. G., Alor Star, Kedah.
1921. STUBINGTON, W. H., Bentong, Penang.
1910. STURROCK, A. J., Ipoh, Perak. (Vice-President, 1924).
1922. SUMMERHAYES, R., c/o Swan & Maclaren, Singapore.
1921. SUTCLIFFE, H., Research Laboratory, Pataling, Selangor.
1912. SWAYNE, J. C., Rejang, Sarawak.
1923. SWORDER, G. H., Taiping, Perak.
1918. †SYKES, G. R., c/o Chinese Protectorate, Singapore.
1923. SYMES, DR. R. L., Kinta, Perak.
1925. TALALLA, BENJAMIN, 12 Perak Road, Kuala Lumpur, Selangor.
1908. TAN CHENG LOCK, 59 Heeren Street, Malacca.
1913. TAYLOR, CLARENCE J., Kuala Sepang Coconut Estate, Sepang, Selangor.
1921. TAYLOR, E. R., Estates Department, Harbour Board, Singapore.
1925. TAYLOR, W. C., Cadets Bungalow, Government Hill, Singapore.
1925. TAYLOR, W. R., c/o Maclaine Watson & Co., Batavia, Java.
1917. TENNENT, M. B., Eliot Vale House, Blackheath, London.
1921. TERRELL, A. K. A. B., c/o Presgrave & Mathews, Penang.
1921. †THOMAS, L. A., Chief Police Office, Singapore.
1920. THOMSON, H. W., Kuala Lipis, Pahang.
1925. THOMSON, R., Carey Island, Port Swettenham, Selangor.
1923. THORNE, W. H., Penang.
1925. THURSTON J. B. H., Buan Heng Estate, Johore Bahru, Johore.
1923. TRAVERS, DR. E. O., Sport's Club, St. James' Square, London.

1924. TUNGKU MAHMOUD IBNI ALMARHUM SULTAN AHAMAT MUKARRAM, SHAH, C.M.G., Alor Star, Kedah.
1924. TUNGKU MOHAMED IBNI SULTAN ABDUL HAMID HALIM SHAH, Alor Star, Kedah.
1921. TYTE, LT.-COL. J. H., Singapore.
1887. VAN BEUNIGEN VAN HELSDINGEN, DR. R., 74 River Valley Road, Singapore. (Hon. Librarian. 1914-15, 1920).
1925. VENABLES, O. E., Brunei, Borneo.
1921. WADE, F. W., Alor Star, Kedah.
1922. WALKER, E. G., c/o United Engineers Ltd., Singapore.
1923. WAN IDRIS BIN IBRAHIM, Johore Bahru, Johore.
1922. WAN YAHYA BIN WAN MOHAMED TAIB, Alor Star, Kedah.
1922. WARD, D. J., 40-5 Grange Road, Singapore.
1921. WATSON, B. S., Kuala Selangor, Selangor.
1916. WATSON, J. G., Forest Department, Kuala Lumpur.
1917. WATSON, J., Education Office, Kuala Lumpur, Selangor.
1916. WATSON, SIR MALCOLM, Klang, Selangor.
1923. WHITE, D. P., Government Veterinary Surgeon's Office, Singapore.
1923. WHITFIELD, L. D. Malay College, Kuala Kangsar, Perak.
1920. WHITEHEAD, C. B., Police Office, Butterworth, Province, Wellesley.
1923. WILKINSON, H. B.
1920. †WILKINSON, R. J., C.M.G., Post Restante, Mitylene, Greece.
1921. WILLBOURN, E. S., Batu Gajah, Perak.
1921. WILLIAMS, E. T., Land Office, Penang.
1922. †WILLIAMS, F. L., Chinese Protectorate, Ipoh, Perak.
1921. WILLIAMS, R. M., c/o Paterson Simons & Co., Ltd., Penang.
1925. WILSON, C., Post Box No. 213, Madras.
1919. WILSON, F. K., Supreme Court, Singapore.
1910. †WINKELMANN, H.
1923. WINSON, V. H., c/o Posts & Telegraphs, Malacca.
1904. WINSTEDT, DR. R. O., (Vice-President, 1914-15, 1920-21, 1923-25).
1925. WITCOMB, L. A., Adamson Gilfillan & Co., Ltd., Penang.
1918. WOLDE, B., c/o Malacca Club, Malacca.
1902. WOLFF, E. C. H., Residency, Seremban.
1908. †WOOD, E. G., c/o HENRY, S., King & Co., 65 Cornhill, London.
1913. WOOD, W. L., Kemayan Estate, Kemayan, Pahang.
1922. WOODGATE, L. C. H., 21 Gorst Road, S.W. 11, London.

1923. Woods, A. H., Egerton Road, Seremban, Negri Sembilan.
1920. Woolley, G. C., Tenom, British North Borneo.
1922. Woolley, H. W., Forest Department, Kuala Lumpur, Selangor.
1922. Worley, N. A., Kuala Lumpur, Selangor.
1911. Worsley-Taylor, F. E., c/o Singapore Club, Singapore.
1905. †Worthington, A. F., Kota Bharu, Kelantan. (Vice-President, 1924).
1921. Wurtzburg, Major C. E., c/o Mansfield & Co., Singapore. (Council, 1924; Hon. Secretary, 1925).
1914. Wyley, A. J.
1923. Wynne, M. L., c/o Police Office, Trengganu.
1923. †Yates, H. S., Boenoet, Kisaran, Sumatra.
1917. †Yates, Major W. G., West Kent Regiment, c/o Cox & Co., 16 Charing Cross, London.
1920. †Yewdall, Capt. J. C., Sitiawan, Perak.
1904. †Young, H. S., Rosemount, Tain, Rosshire, England.
1920. Zainal Abidin Bin Ahmad, Inche, Sultan Idris Training College, Tanjong Malim, Perak.

# RULES

of

# The Malayan Branch

of the

# Royal Asiatic Society

## I. Name and Objects.

1. The name of the Society shall be 'The Malayan Branch of the Royal Asiatic Society.'

2. The objects of the Society shall be:—

(*a*) The increase and diffusion of knowledge concerning British Malaya and the neighbouring countries.

(*b*) the publication of a Journal and of works and maps.

(*c*) the acquisition of books, maps and manuscripts.

## II. Membership.

3. Members shall be of three kinds—Ordinary, Corresponding and Honorary.

4. Candidates for ordinary membership shall be proposed and seconded by members and elected by a majority of the Council.

5. Ordinary members shall pay an annual subscription of $5 *payable in advance on the first of January in each year.*

No member shall receive a copy of the Journal or other publications of the Society until his subscription for the current year has been paid.

Members shall be allowed to compound for life membership by a payment of $50. Societies and Institutions are eligible for ordinary membership.

6. On or about the 30th of June in each year the Honorary Treasurer shall prepare and submit to the Council a list of those members whose subscriptions for the current year remain unpaid. Such members shall be deemed to be suspended from membership until their subscriptions have been paid, and in default of payment within two years shall be deemed to have resigned their membership*

*Bye-Law, 1922. "Under Rule 6 Members who have failed to pay their subscription by the 30th June are suspended from membership until their subscriptions are paid. The issue of Journals published during that period of suspension cannot be guaranteed to members who have been so suspended."

7. Distinguished persons, and persons who have rendered notable service to the Society may on the recommendation of the Council be elected Honorary Members by a majority at a General meeting. Corresponding Members may, on the recommendation of two members of the Council, be elected by a majority of the Council, in recognition of services rendered to any scientific institution in British Malaya. They shall pay no subscription; they shall enjoy the privileges of members (except a vote at meetings and eligibility for office) and free receipt of the Society's publications.

## III. Officers.

8. The Officers of the Society shall be:—
A President.
Vice-Presidents not exceeding six, ordinarily two each from (i) the Straits Settlements, (ii) the Federated Malay States and (iii) the Unfederated or other Protected States, although this allocation shall in no way be binding on the electors.
An Honorary Treasurer. An Honorary Secretary.
Five Councillors.

These officers shall be elected for one year at the Annual General Meeting, and shall hold office until their successors are appointed.

9. Vacancies in the above offices occurring during any year shall be filled by a vote of the majority of the remaining officers.

## IV. Council.

10. The Council of the Society shall be composed of the officers for the current year, and its duties and powers shall be:—

(*a*) to administer the affairs, property and trusts of the Society.

(*b*) to elect Ordinary and Corresponding Members and to recommend candidates for election as Honorary Members of the Society.

(*c*) to obtain and select material for publication in the Journal and to supervise the printing and distribution of the Journal.

(*d*) to authorise the publication of works and maps at the expense of the Society otherwise than in the Journal.

(*e*) to select and purchase books, maps and manuscripts for the Library.

(*f*) to accept or decline donations on behalf of the Society.

(*g*) to present to the Annual General Meeting at the expiration of their term of office a report of the proceedings and condition of the Society.

(*h*) to make and enforce by-laws and regulations for the proper conduct of the affairs of the Society. Every such bye-law or regulation shall be published in the Journal.

11. The Council shall meet for the transaction of business once a quarter and oftener if necessary. Three officers shall form a quorum of the Council.

## V. General Meetings.

12. One week's notice of all meetings shall be given and of the subjects to be discussed or dealt with.

13. At all meetings the Chairman shall in the case of an equality of votes be entitled to a casting vote in addition to his own.

14. The Annual General Meeting shall be held in February in each year. Eleven members shall form a quorum.

15. (i) At the Annual General Meeting the Council shall present a report for the preceding year and the Treasurer shall render an account of the financial condition of the Society. Copies of such report and account shall be circulated to members with the notice calling the meeting.

(ii) Officers for the current year shall also be chosen.

16. The Council may summon a General Meeting at any time, and shall so summon one upon receipt by the Secretary of a written requisition signed by five ordinary members desiring to submit any specified resolution to such meeting. Seven members shall form a quorum at any such meeting.

17. Visitors may be admitted to any meeting at the discretion of the Chairman but shall not be allowed to address the meeting except by invitation of the Chairman.

## VI. Publications.

18. The Journal shall be published at least twice in each year, and oftener if material is available. It shall contain material approved by the Council. In the first number of each volume shall be published the Report of the Council, the account of the financial position of the Society, a list of members and the Rules.

19. Every member shall be entitled to one copy of the Journal, which shall be sent free by post. Copies may be presented by the Council to other Societies or to distinguished individuals, and the remaining copies shall be sold at such prices as the Council shall from time to time direct.

20. Twenty-five copies of each paper published in the Journal shall be placed at the disposal of the author.

## VII. Amendments of Rules.

21. Amendments to these Rules must be proposed in writing to the Council, who shall submit them to a General Meeting duly summoned to consider them. If passed at such General Meeting they shall come into force upon confirmation at a subsequent General Meeting or at an Annual General Meeting.

## Affiliation Privileges of Members.

*Royal Asiatic Society.* The Royal Asiatic Society has its headquarters at 74 Grosvenor Street, London, W., where it has a large library and collection of MSS. relating to oriental subjects, and holds monthly meetings from November to June (inclusive) at which papers on such subjects are read.

2. By Rule 105 of this Society all the Members of Branch Societies are entitled when on furlough or otherwise temporarily resident within Great Britain and Ireland, to the use of the Library as Non-Resident Members and to attend the ordinary monthly meetings of the Society. This Society accordingly invites Members of Branch Societies temporarily resident in Great Britain or Ireland to avail themselves of these facilities and to make their home addresses known to the Society so that notice of the meetings my be sent to them.

3. Under Rule 84, the Council of the Society is able to accept contributions to its Journal from Members of Branch Societies, and other persons interested in Oriental Research, of original articles, short notes, etc., on matters connected with the languages, archæology, history, beliefs and customs of any part of Asia.

4. By virtue of the aforementioned Rule 105 all Members of Branch Societies are entitled to apply for election to the Society without the formality of nomination. They should apply in writing to the Secretary, stating their names and addresses, and mentioning the Branch Society to which they belong. Election is by the Society upon the recommendation of the Council.

5. The subscription for Non-Resident Members of the Society is 30/– per annum. They receive the quarterly journal post free.

*Asiatic Society of Bengal.* Members of the Malayan Branch of the Royal Asiatic Society, by a letter received in 1903, are accorded the privilege of admission to the monthly meetings of the Asiatic Society of Bengal, which are held usually at the Society's house, 1 Park Street, Calcutta.

# The Ferns of the Malay Peninsula.

*By* H. N. RIDLEY, M.A., C.M.G., F.R.S.

With this account of the Ferns, the account of the flora of the Malay Peninsula as far as is known is completed now that the work on the flowering plants is published. The Lycopodiaceae, Marsiliaceae etc., have already been published (Journ. Straits Br. Roy. As. Soc. No. 80. 1919, p. 139). Still, however, remain the Mosses, *Hepatics, Fungi, Lichens and Algae which have as yet only been partially collected. The number of ferns in our area is large, about 420 species, and many of these are very abundant in individuals. The damp, hot forests are very suitable to the growth of these plants, not only terrestrial, but epiphytic ones. The thin herbaceous species haunt the damp forests, but in the few dry areas we have as on Gunong Tahan these disappear and are replaced by the stiff, coriaceous species. The epiphytic species also have usually stiff coriaceous fronds.

The abundance of spores produced and their lightness allowing them to be dispersed by air currents to immense distances result in the species themselves being very widely distributed. The contrast between these plants and the flowering plants in area of distribution of species is very great. A very large proportion of our flowering plants are endemic, that is to say, not known outside the Malay Peninsula, and very few (except weeds in recent years carried about by man) occur in both hemispheres, whereas a considerable number of ferns occur on both sides of the world, while the greater part range from the Mascarene islands to Polynesia. We have a small number of endemic species, but it is not to be compared with the number of endemic species of flowering plants occurring in the Peninsula.

I have adopted largely the nomenclature at present in vogue as given in Christensen's *Index Filicum* and van Alderwereldt van Rosenberg's *Malayan Ferns,* though occasionally reverting to an older style e.g., in retaining the genera *Nephrodium* and *Lastraea* in place of combining them under the gigantic and over-bulky *Dryopteris,* as is commonly done now.

I am indebted to Mr. C. G. Matthew, and Mr. C. H. Wright for frequent assistance in difficult identifications.

## GLEICHENIACEAE.

### 1. **Gleichenia** Sm.

Much branched rigid ferns with a creeping rhizome, usually growing in great masses, fronds pinnate dichotomous, segments narrow coriaceous, rarely suborbicular. Sori of few sessile capsules

*A list of the Mosses of the Malay Peninsula by H. N. Dixon, will shortly appear in the Straits Settlements Gardens Bulletin IV, Part 1, 1926.

on the tip of a veinlet or near the middle of one. No indusium. Capsules opening vertically surrounded by a complete broad, transverse ring. Species about 80, all through the tropics. *Native name* for the large species, Resam. *Use.* The stems for making pens and in fishing stakes.

§. **Eugleichenia.** Lobes very small, rounded.

(1). ***G. circinnata*** Sw. Syn. Fil. 165. Hook. Syn. Fil. 11 *G. semivestita* Lab. Sert. Austr. Cal. 8. t. 11. *G. microphylla* R. Br. Fronds 2 to 3 or 4 feet tall, wide spreading, dichotomous, stipes wiry usually naked. Pinnae 12 in. long or less, pinnules very narrow, 2 in. long or less, lobes rounded, very small, edges recurved, naked or with chaffy pubescence; rachis red-hairy. Capsules 3 or 4. *Hab.* Mountains from 4000 feet upwards, rarely lower, on rocks and by streams. Johore, Gunong Belumut (Holttum); Malacca, Mount Ophir (all collectors); Perak, Gunong Inas (Yapp); Gunong Bubu (Cantley and Kunstler). Province Wellesley, Bukit Panchur (Ridley). Kelantan, Gunong Sitong (Nur) *Distrib.* Malay isles, Australia, New Zealand.

(2). ***G. vulcanica*** Bl. Enum. 251. *G. dicarpa* var. *alpina* Beddome, Handbook F. B. I. Suppl. p.l. Compact dwarf plant; rachis and young shoots covered with red wool. Fronds as in *G. circinnata* but shorter; lobes orbicular cucullate. Capsules 2, mixed with red hairs. *Hab.* Mountains. Pahang, Gunong Tahan 6000 ft. alt. (Ridley); Perak (Scortechini); Kedah Peak (Robinson).

This appears to me a high mountain form of *G. circinnata* *Distrib.* Malay isles.

§ **Mertensia.** Lobes oblong-linear.

(3). ***G. Norrisii*** Mett. in Reliquae Mettenianae, Kuhn Linnea 36, 165. Glabrous. Branches 2 to 3 feet long, upper part of rachis usually angled; pinnae lanceolate, lower ones stalked 6 to 9 inches long; pinnules narrow oblong blunt, coriaceous, glaucous beneath when quite young only, .6 to .5 in. long, .1 in. wide; veinlets once forked. Sori medial. Capsules 4. *Hab.* Mountains; Malacca (Griffith), Perak Gunong Hijau (Matthew), Penang, 1800 to 2600 ft. (Kunstler, Pinwill, Norris). *Distrib.* Sumatra.

(4). ***G. glauca*** Hook. Sp. i. 4. Pl. 3B. *G. longissima* Bl. Enum. Pl. Jav. p. 250. A very long species forming dense masses, glabrous; stipes rather stout, secondary pinnae alternate 6 to 8 in. long, 1 to 2 in. wide, lobed nearly to rachis; pinnules linear-oblong or lanceolate blunt, slightly glaucescent beneath, glabrous or tomentose beneath .3 in. long, .1 in. wide, very close set; nervules numerous, close. Capsules 3 to 5. *Hab.* Mountains. Johore, Gunong Pulai (Ridley 12127). Malacca, Mount Ophir (Lang).

Pahang, Gunong Tahan (Ridley 15998). Perak, Thaiping Hills. Penang (Norris). Kedah Peak (Ridley). *Distrib.* India, Java.

(5). ***G. parallela*** Ridl. n. sp. Big branching fern, nearly glabrous, stipes stout, fronds large; pinnae subopposite 6 in. long; pinnules linear-oblong blunt, tip shortly bifid, coriaceous, glaucous beneath, very close set and not dilate at base 1.25 in. long, .1 in. wide; nervules very close, parallel, faint. Sori very numerous and close to the costa 10 to 20 in a row. Capsules about 10. Basal lobes in axils of branches lobed, striate. *Hab.* Penang (Curtis 534).

Referred by Baker to *G. longissima,* but much nearer *G. linearis* from which it conspicuously differs in having the pinnules not dilate at base, closely parallel and the sori close to the costa.

(6). ***G. linearis*** (Burm.) Clarke Trans. Linn. Soc. i. 428. *G. Hermanni* R. Br. Enum. 248. *G. dichotoma* Hook. Sp. Fil. 15. A tall fern growing in masses. Fronds large, repeatedly di-or trichotomous, basal pair of pinnae at lowest fork ovate lobed, secondary pinnae linear, base dilate 12 in. long or more, pinnules linear narrow, close set, tip rounded or bifid, coriaceous, usually glaucescent beneath 2 to 3 in. long, .12 in. wide; nervules very close and parallel. Sori about 30 not crowded, of about 4 capsules. *Hab.* Very common in great masses in the lowland on clay soil. Occasionally ascending to 5000 feet. Singapore Garden Jungle. Johore, Gunong Pulai (Ridley); Malacca (Cuming); Pahang, Gunong Tahan. Perak, Goping and Sungei Rayah (Kunstler) Gunong Inas (Yapp). Penang (Matthew); Waterfall (Oldham). Kedah Peak (Robinson). *Distrib.* Malaya to Australia.

var. ***rigida*** Rac. fronds very stiff, coriaceous, edges conspicuously undulate; nerves prominent conspicuously forked. Pahang, Fraser Hill (Burkill and Holttum).

var. ***ferruginea*** Racib. Under surface of fronds and rachis with ferruginous scurfy tomentum. Penang Hill (Matthew). *Distrib.* Tropics, New Zealand.

(7). ***G. laevigata*** Hook. fil. Sp. Fil. i. 10. *G. flagellaris* Hook. fil. Syn. Fil. 14, (not of Sprengel) *G. javanica* Spreng. Syst. Veg. i. 25; *G. bifurcata* Bl. Enum. 250. Stems rather stout, stiff, smooth shining, 4 or 5 ft. tall, dichotomous. Ultimate pinnae 4 to 12 in. long, pinnules very close set, linear truncate, coriaceous, not glaucous, 1 in. long, less than .10 in. wide, extreme tips of pinnae with much reduced pinnules. Sori about 40. Capsules 4 or 5. *Hab.* Common in open clayey soils. Whole peninsula. Singapore (Walker, Murton). Johore, Gunong Belumut (Holttum). Malacca, Mount Ophir (Griffith, Derry). Pahang, Gunong Tahan (Ridley). Negri Sembilan, Gunong Angsi (Ridley). Selangor, Kuala Lumpur. Perak, Maxwell's Hill (Ridley). Penang Hill. Kedah Peak (Robinson) 3000 ft. alt. *Distrib.* Java, Sumatra, Borneo.

(8). ***G. hirta*** Bl. Enum. Pl. Jav. 250. Fronds erect, little branched, red-hairy, primary branches 3-to 4-forked 18 in. long, pinnae 16 in. long linear, pinnules narrow-linear acuminate from a broader base, glaucous beneath, 1 in. long, .1 in. wide. Sori about 20, on the ends of inconspicuous nervules. Capsules 4 or 5. *Hab.* Mountains, Johore, Gunong Belumut (Holttum). Malacca, Mount Ophir (Lang, Ridley). Pahang, Gunong Tahan. Perak (Scortechini). Penang Hill at top of West Hill (Norris, Ridley, Hullett). Kedah Peak (Ridley); Gunong Bintang (Kloss). *Distrib.* Malay isles.

(9). ***G. pteridifolia*** Cesati Felic. Born. p. 2. *Mertensia pteridifolia* Presl. Epimel. Bot. 23 fig. 14. More slender and very long, climbing to the tops of trees; pinnae and pinnules much shorter. Pinnae 8 in.; pinnules 1.5 in. long, glaucous beneath, sori small of 10 or 12 capsules; pinnae often ending in long narrow linear points lobed at base and entire at tip. *Hab.* Very common on the edge of forests. Singapore, Garden Jungle; Bukit Timah (Murton, Ridley). Malacca (Maingay). Penang, Muka Head (Curtis 997).

I think this is the same as the Philippine and Borneo plant *G. pteridifolia.* It has been confused with *G. linearis* by all other authors.

## POLYPODIACEAE.

### CYATHEAE.

### 2. **Cyathea** Sm.

Stem short and stout erect (or tall). Frond pinnate (tripinnate or simple). Sori globose at or near the forking of a vein. Capsules numerous compact on an elevate receptacle, obovate with a broad vertical ring. Indusium covering the whole sorus, breaking at the top and leaving a persistent cup. Species about 100, all tropics.

(1). ***C. moluccana*** R. Br. in Desv. Prod. Mem. Soc. Linn. 1827, part 2, p. 322. *C. Brunonis* Wall. Cat. 171. Stem stout, 6 to 12 in. tall to 4 feet. Fronds 4 to 9 feet long, simply pinnate; pinnae oblong lanceolate, base broad acuminate, edge crenulate, 8 in. long, 1 in. wide; nervules very fine, 3-branched. Sori medial on the nervules, indusium persistent as a ribbed saucer. Capsules very numerous. *Hab.* Common in forests. Johore near Castlewood; Batu Pahat (Ridley 11601). Malacca, Bukit Kayu Arang (Cantley); Bukit Tungul (Ridley 4403) and Bukit Bruang. Pahang Tahan River (Ridley). Negri Sembilan, Perhentian Tinggi (Ridley). Selangor, Kuala Lumpur (Ridley). Perak Batang Padang (Murdoch); Goping (Kunstler 730, 475); Larut (Kunstler 7036); Sira Rimau (Yapp 558). Penang Hill near top (Ridley 7036) (Lobb.) Kelantan, Sungei Keteh (Nur). *Distrib.*

Sumatra, Borneo. *Native names.* Paku Pahat; Paku Gajah Payah; Paku Hitam Payah; Paku Salamah. *Use.* Fronds as a vegetable by Jakuns, and for poulticing sore legs.

(2). ***C. alternans*** Presl. Abh. Bohm. Ges. v. 347. *Alsophila alternans* Hook. Sp. Fil. i. 29; Ic. Pl. t 622. *Amphicosmia alternans* Bedd. Handbook p. 10. Stem 5 feet tall. Frond sub-tripinnate. Petiole stout with long lanceate acuminate scales over 1 in. long on upper edge. Pinnae distant 10 to 14 in. long, 2 to 3 in. wide, oblong acuminate, lobes 1 to 1.5 in. long, oblong blunt or sterile ones acute; nervules forked. Sori in the axil, or none, usually median above the fork. Indusium complete. *Hab.* open parts of forest. Negri Sembilan, Gunong Angsi (Holttum). Perak Goping (Kunstler 654). Penang (all collectors). Kelantan, Sungei Keteh (Nur). *Distrib.* Borneo.

var. ***serrata.*** Pinnules oblong-linear acuminate closely serrate, 2 in. long .4 in. wide, rather coriaceous and narrowed at the base Penang Hill, road to Penara Bukit (Ridley 7151, 7153).

A very different looking plant, possibly specifically distinct and quite similar to *C. sarawakensis* Hook., collected by Lobb in Borneo.

(3). ***C. obtusata*** Rosenstock, Mededeeling's Rijks Herbarium Leiden 31 p. 1. Near *C. javanica* Bl. Fronds with rachis and primary midribs above red hairy, beneath sparsely hairy, with linear scales admixed, lobes linear blunt. Indusium of one to three linear scales, centre narrowly gyriform. *Hab.* Perak (Kunstler 1148). I have not seen this.

### 3. **Alsophila** Br.

Tree ferns, stem stout 1 to 30 feet tall. Fronds usually large divided, pinnules membranous or sub-coriaceous. Veins simple or forked, free or rarely joining towards the margin. Sori globose on a vein or veinlet or in the fork; receptacle elevate. Indusium wanting. Tropics generally; species 180.

(1). ***A. dubia*** Bedd. Handbook, Suppl. p. 4. Journ. Bot. XXV. p. 321. Stem 8 to 12 feet tall, 3 in. through. Fronds 4 to 5 feet long; petiole and rachis purple-brown, slightly furfuraceous above, bi-pinnate. Pinnae 6 to 20 in. long, pinnules 4 in. long, .5 in. wide, base broad, very shortly lobed or rather deeply crenate, slightly unequal at base petioluled or occasionally lobed about half way, with truncate lobes; nervules pinnate not branched. Sori few, medial usually on the lower 2 nervules. *Hab.* Mountains at about 4000 feet. Pahang, Gunong Tahan (Ridley 15993); pinnules very little crenate; Telom (Ridley 1393); Fraser Hill (Burkill and Holttum). Perak, Gunong Bubu 3500 to 4000 feet (Kunstler 7356); Larut (2493) (Scortechini); Gunong Inas (Yapp). Kelantan, Sungei Keteh (Nur). *Distrib.* Java.

Yapp's specimen in fruit has the lower pinnules lobed to the base, upper ones merely serrate, much smaller than any other specimen I have seen, the sori large and on the lobed pinnules in 2 close rows in a V to the tip. I should doubt it being this species, but Matthew quotes it.

(2). ***A. umbrosa*** Wall. Cat. 1336 (Polypodium). A dwarf fern; stem about 12 in. long, slightly scabrous at base. Fronds large spreading; stipes dark shining brown-black, smooth; pinnae 1 to 1.5 feet long, pinnules lanceolate acuminate, point serrate, base broad shortly pedicelled, 3 to 4 in. long, .5 in. wide quite entire except the tip or lobed for a quarter of the length, lobes rounded or shortly toothed. Veinlets 4 to 7 on a central vein running to the margin. Sori 4 to 6 on the middle of the vein, receptacle hairy. *Hab.* Forests. Singapore, Bukit Timah (Ridley); near Selitar (Matthew). Johor, Tempayan River (Ridley). Pahang, Telom (Ridley 13931); Gunong Tahan, Wray's Camp (Ridley 16204). Perak Gunong Hijau at 4000 feet alt (Matthew). Penang (Wallich 1336). Kedah Peak (Ridley 5156, 5167; Robinson).

This has been confused with *glabra* by most authors, but is very distinct; Robinson's Kedah Peak form has quite entire pinnules. In the Bukit Timah plant etc. the upper ones are lobed as in the type.

(3). ***A. glabra*** Hook. Syn. Fil. p. 43. *A. gigantea* Wall. Cat. 321. Stem 12 in. tall (or more). Stipes and rachis shining black. Frond large, pinnae 12 in. long, pinnules remote, lanceolate acuminate tip crenate, base broad, pedicel short, 2 in. long, .25 in. wide, lobes short blunt or rounded, veinlets 3 pairs. Sori small arranged in a V, crowded. *Hab.* Limestone rocks, Selangor, Kanching (Ridley) *Distrib.* India, Malaya.

(4). ***A. Ridleyi*** Bak. Ann. Bot. viii. 122. Almost stemless. Fronds about 3 feet long, stipes with scales at the base as in *A. comosa* Wall.; rachis slightly scurfy, primary pinnae 18 in. long, .5 in. wide, sub-herbaceous, lobes oblong oblique truncate, only cleft half way and in life overlapping; nervules about 4 pairs. Sori stalked. *Hab.* In low wet forests. Singapore, Chua Chukang (Ridley 3031) and Sungei Morai (4401).

Referred by some botanists to *A. comosa,* but it never produces a tall stem like that species, the fronds are much thinner in texture, and the pinnules much less deeply cut.

(5). ***A. comosa*** Wall. Cat. 319. *A. squamulata* Hook. Syn. Fil. i. 51. partly. Stem 8 to 12 feet tall, 3 in. through. Fronds bi-pinnate, 6 to 8 in. long, base of stipes covered with crowded lanceolate acuminate scales 1 in. long; rachis tawny villous above, primary pinnae 14 to 16 in. long, 6 to 8 in. across; pinnules oblong, base broad 2.5 in. long, .75 in. wide; lobes oblong, oblique blunt serrate at the top in sterile fronds; rachis scurfy. Veins

simple or forked. Sori rather small, receptacle small elevate, often with long hairs mixed with the capsules. *Hab.* Common in forests up to about 3000 feet. Singapore, Bukit Timah; Jurong, Reservoir. Johore, Jaffaria (King). Pahang, Telom (Ridley 13930). Selangor, Bukit Kutu (Ridley 7866). Perak, Maxwell's Hill (Curtis 2692); Gunong Merah (Kunstler 7148). Penang Hill (Ridley 7017) Mt. Elvira (Matthew). *Distrib.* Malay islands.

Specimens somewhat variable. The plant from Telom has stiffly coriaceous fronds. A specimen from the top of Penang Hill (coll. Pinwill) is nearly stemless, the fronds simply pinnate, rachis densely hairy with long linear acuminate scales which run on to the midrib of the pinnules beneath, midrib also hairy on both sides. Clarke writes *A. comosa ?*. I think it is an abnormal state.

(6). ***A. obscura*** Scort. Bedd. Journ. Bot. 1887, 321 t. 278, fig. 2. Stem 6 to 7 feet tall. Fronds 4 to 5 feet long, 2 feet broad, bi-pinnate; petiole densely clothed downwards with long lanceolate sharply serrate scales, rachis scaly above. Pinnae 1 to 1.5 feet long, 3 to 6 in. wide, rachis hairy; pinnules lanceolate oblong blunt, 1.5 to 3 in. long, subcoriaceous, lobes cut half way down into broad blunt almost truncate lobes; veins 4 to 5 pairs, simple and forked, sori medial on lower veins mixed with long moniliform hairs. Pahang, Telom (Ridley 13930). Perak (Scortechini).

(7). ***A. commutata*** Mett. Ann. Lugd. Bat. i. 53. Hook. Syn. Fil. p. 43. Stem short to 10 feet tall. Fronds bi-pinnate; petiole smooth black with small asperities at base; pinnae 18 in. long, pinnules broad at base, 3 in. long 1 in. wide, lobes cut more than half way down, broad rounded ovate oblong, .3 in. long, .2 in. wide slightly serrate at tip, coriaceous; nervules numerous. Sori in fertile part of frond which is much narrower, very crowded. *Hab.* mountains at 4000 feet. Malacca near Ophir (all collectors). Pahang, Kluang Terbang (Barnes); Fraser Hill (Burkill and Holttum). Selangor, Bukit Hitam (Ridley 7869); Perak, Gunong Bubu (Cantley); Gunong Merah (Kunstler); Gunong Kerbau (De Morgan.)

*A. commutata* Mett. is based on *Gymnosphaera squamulata* Hook., Genera Filicum t. 100 which is not the plant so described by Blume, and the type of which is Cuming's plant from Mt. Ophir No. 396. It is a dwarf tree fern with very coriaceous fronds, the rachis and midribs of pinnules are slightly hairy in the Malacca, and very hairy on the Selangor and Perak ones. In the smaller plants the upper fronds are broad with broad lobes and sparse sori; in bigger ones the lower pinnules or the whole pinna is fertile, the pinnules 2 in. long, .2 in. wide with very short lobes densely covered with sori.

(8). ***A. trichodesma*** Bedd. Journ. Bot. xxv. p. 321. Trunk middle-sized slender; petiole scaly at base, fronds 4 to 6 feet long bi-pinnate; rachis scabrid above clothed with semi-viscous copious

jointed hairs; pinnae narrow lanceolate, 24 to 30 in. long, 6 to 8 in. wide, pinnules linear lanceolate, 3 to 4 in. long, .75 in. wide, thinly herbaceous clothed with the same hairs on both sides and nervules, lobes linear blunt, crenulate sub-remote cut nearly to base; nervules 7 to 8 on each side forked; sori medial 5 to 6 on each side. *Hab.* Perak (Scortechini) not seen. A remarkably hairy plant.

(9). ***A. Kingi*** Bedd. Handbook, additions. *A. Bakeri* Zeill. Extr. Bull. Soc. Bot. France xxxii. 72. Tree fern 6 to 15 feet tall, 3 to 4 in. through. Fronds 5 to 8 feet long; petiole and rachis purple, glabrous very sparsely and minutely tuberculate, pinnae 24 in. long, pinnules 3 in. long .5 in. wide, coriaceous, lobes oblong blunt cut down almost to the costa, edges crenulate, .3 in. long (sterile), .2 in. long (fertile) .1 in. wide; nervules forked from a little above base, receptacles prominent. Sori numerous covering the lobes. *Hab.* Mountains in forest 4 to 5600 feet alt. Pahang, Gunong Tahan (Ridley 15994); Fraser Hill (Burkill and Holttum 8492.) Perak, Gunong Bubu (Kunstler 7402); Larut (Kunstler 2416); Gunong Inas (Yapp 515); Gunong Kerbau (De Morgan.)

(10). ***A. latebrosa*** Hook. Sp. Fil. i. 37. Stem 8 to 12 feet tall. Fronds very large, stipes roughly aculeate at base, and shortly prickly upwards, dark brown; primary pinnae oblong about 2 feet long, 6 to 8 in. wide, pinnules lanceolate acuminate, 3 to 4 in. long, cut down nearly to the base into linear-oblong blunt lobes slightly serrate at tip; nervules forked numerous. Sori 6 to 8 at the base of the lobe. *Hab.* The common species in the lowland forest up to about 3000 feet alt. Singapore, Bukit Timah; Chan Chu Kang (Ridley 6123). Johore, Tanjong Kupang (Ridley 4400) Batu Pahat (Ridley 11063) Kluang (Holttum). Malacca, Ayer Panas; Ayer Keroh (Ridley 10705). Negri Sembilan Gunong Angsi (Nur). Selangor, Batang Berjuntai (Ridley 7870) and Batu Caves (8141); Bukit Kutu (7865). Pahang Fraser Hill (Burkill). Perak, Sirah Rimau (Yapp 601); Temengoh (Ridley 14207); Kinta; Thaiping (Kunstler). Penang (Wallich 318). Prov. Wellesley, Tasek Gelugur (Ridley 6965). Kedah, Yan (Ridley 5177). Kelantan, Kwala Pertang (Haniff). *Distrib.* Borneo, Java, Cochinchina, Sumatra, India to Philippines.

The specimens from Java and further East often have the sori quite covering the lobe, and the lobe often serrate distinctly to the base.

var. ***ornata.*** *Alsophila ornata* Scott Trans. Linn. Soc. xxx, 36 t. 16A. Bedd. F.B.I. t. 342. Lobes of pinnules narrow oblong cut to the base and conspicuously serrate at the top which is slightly narrowed and blunt. Johore, Tanjong Kupang (Ridley 6551). Perak, (Scortechini). *Distrib* Sikkim.

Clarke identifies his *A. sikkimensis* with Scott's *ornata* and says it has no prickles on the petiole, but the specimens show long

scales instead. The Johore plant which in foliage is exactly like the Sikkim plant has a prickly petiole as in *latebrosa*. The type of Scott, Rungbee at 5,500 feet coil. Gammie, has a rough petiole.

var. ***denudata*** Bedd. Journ. Bot. 31, p. 225. Differs from the type form in the main and partial rachis of the pinnules being quite glabrous underneath. Johore, Patani, Batu Pahat (Ridley 10981). Perak (Scortechini).

I doubt if this is anything more than a state of *A. latebrosa*.

(11). ***A. contaminans*** Wall. Cat. Index 254. Hook. Syn. Fil. p. 41. *A. glauca* J. Smith, Hook. Journ. Bot. iii. 419: Tall tree-fern 20 feet high. Fronds large, petiole and rachis ashy blue, armed below with short straight thorns; pinnae 2 to 3 feet long, pinnules 4 to 5 in. long, .5 to 1 in. wide cut down to the costa in linear oblong sub-falcate lobes sub-coriaceous, .5 in. long, .1 in. wide, tip rounded; nervules forked. Sori about 12, covering the lobe. *Hab.* Common near the mountain tops and easily recognised by its beautiful blue leaf stalks. Johore, Bukit Soga (Ridley 1066). Sungei Ujong (Hullett). Selangor, Ginting Bidai (Ridley 7868); Semangkok Pass (8633); Klang Water catchment forest (Burkill). Perak, Thaiping Hills (Kunstler 4032). Penang (Wallich, Ridley 7150). Kedah Peak (Ridley 5543). Kelantan, Kwala Badang (Haniff). *Distrib.* India, Ceylon, Malay isles.

Wallich's name is the oldest. He gave it as *Polypodium contaminans* in the catalogue and on the ticket for his No. 320, and in an index of corrections transferred it to *Alsophila* p. 254.

### 4. **Diacalpe** Bl.

Simple tufted fern, rhizome not creeping. Fronds pinnate, Sori globose, receptacles small scarcely elevate. Indusium globose entire, bursting irregularly at top. Capsules numerous subsessile. Species 1.

(1). ***D. aspidioides*** Bl. Enum. Pl. Jav. Fil. 241. Fronds tripinnate sub-membranous; petiole long, scaly at base with rather broad lanceolate scales; frond about 12 in. long, 7 in. wide, pinnules .5 in. long, lobed to base elliptic blunt, some serrate, nervules rather faint. Sori medial on lower veinlets. *Hab.* Perak (Scortechini) fide Beddome. *Distrib.* India, Siam, China, Java, Celebes, Philippines.

### 5. **Dennstaedtia** Bernh.

Herbaceous ferns. Fronds sometimes much branched. Veins free simple forked or pinnate. Sori at tip of vein. Indusium cup-shaped not or very indistinctly 2 valved. Species 60. All tropics.

(1). ***D. scandens*** Moore Parker's Catalogue 1858. *Dicksonia scandens* Bl. Enum. 240 (not of Baker). *D. moluccana* Hook. Syn. Fil. 53. "A very large fern with habit of a *Gleichenia*

trailing over scrub" (Matthew). Branchlets slender prickly; pinnae sub-deltoid 8 in. or more long, 6 in. wide, pinnules distant with distant lobes cut to base, .5 in. long oblong blunt with about 11 rounded lobules; costa and rachis sparsely hairy, sub-coriaceous to membranous; nervules pinnate. Sorus on the edge of a notch on upper edge of a lobule. *Hab.* Mountains 4000 feet and upwards. Pahang Fraser Hill (Holttum). Perak at 4600 feet (Hose); Maxwell's Hill (Matthew). Gunong Bubu, near top (Cantley) *Distrib.* Java, Philippines, Samoa.

(2). ***D. ampla*** Bedd. Journ. Bot. 1893, 227. *Dicksonia ampla* Bak. Journ. Linn. Soc. 22, 223. Rhizome creeping .75 in. through clothed with thick dark scales. Frond 4 feet or more deltoid tripinnate sub-coriaceous, rachis brown pubescent down the channelled face; pinnae oblong-lanceolate, 2 to 3 feet long, 10 in. wide, pinnules lanceolate acuminate cut down close to the costa, lobes oblong rounded, .3 in. long, .2 in. wide; nervules pinnate. Sorus one or 2 on the base of the inner edge close to the bottom of the cleft. Indusium outer valve large semi-orbicular. *Hab.* Mountains. Perak (Scortechini); Maxwell's Hill (Ridley 5188, Kunstler 2159). *Distrib.* Borneo.

(3). ***D. Kingii*** Bedd. Journ. Bot. 1893, 227. *Dicksonia Kingii* Bedd. Handbook Supp. p. 6. Stem erect. Petiole stout 18 in. long. Fronds 3 to 4 feet long, deltoid lanceolate quadri pinnatifid, pinnae 8 to 10 in. long, lanceolate, pinnules 2.5 in. long or less upwards, coriaceous, cut down to the base or nearly into oblong broadly toothed lobes, lower ones narrowed at the base, .4 in. long .1 in. wide or smaller; nervules prominent simple or forked. Sori 1 or 2 terminal on the veins on the edge of one of the lower teeth. *Hab.* Mountains. Pahang, Fraser Hill (Holttum). Perak, Gunong Batu Putih (Kunstler 8058 and Larut 2118); Maxwell's Hill 3500 feet (Matthew).

### 6. **Cibotium** Kaulf.

Big ferns arborescent or not, with large tri-pinnate fronds; sori at the tip of a nervule. Indusium 2-valved, outer valve coriaceous free from the frond. Species 8, chiefly Polynesian and S. American.

(1). ***C. Barometz*** Sm. Lond. Journ. Bot. 1.437. Rhizome short stout densely golden hairy. Fronds about 6 feet long, tripinnate; pinnae 1 to 2 feet long, 6 to 12 in. wide; petiole long, ebony black; pinnules linear long acuminate coriaceous glaucous beneath, lobes cut to the base linear oblong or lanceate, .2 in. long. Sori 2 to 12. Costa sparse hairy. *Hab.* Rather dry hills in forests. Johore, Batu Pahat (Ridley 10981). Pahang, Teku, Gunong Tahan (Haniff) Fraser Hill (Holttum). Selangor, Klang Gates (Ridley 13441); Bukit Kutu (7864). Perak, Temengoh (Ridley 14246); Gunong Merah (Kunstler 7124); Gunong Kerbau

3500 feet (Robinson). Penang, Mount Elvira (Curtis 3103). Kedah Peak (Ridley 5176). *Distrib.* Assam, S. China, Sumatra.

I have seen this plant with a stem 4 feet tall in Kedah, but the rhizome is generally short and only a few inches tall. The plant is known as "Penawar Jambi," and the soft golden hairs used as a styptic.

### 7. **Matonia** Br.

Rhizome creeping; fronds flabellate; in our species pinnae coriaceous linear, lobed nearly to costa, receptacle of a firm membranous umbrella-shaped 6-lobed stalked involucre covering and enclosing 6 large sessile capsules; veins forked. Species 2. Malay peninsula and Borneo.

(1). ***M. pectinata*** Br. Wall. Pl. As. Rar. I. t. 16. Bedd. F. B. I. t. 186. Rhizome creeping, stout red-woolly; petioles 2 feet tall frond of about 15 pinnules over 12 in. long, all glabrous; lobes .25 in. long, linear falcate, sori near base. *Hab.* Open spots on mountains 3000 to 4000 feet. Johore, Gunong Belumut (Holttum). Malacca, Mount Ophir (Griffith, Cuming etc). Pahang, Gunong Tahan (Ridley). Selangor, Hulu Semangkok. Perak, Gunong Bubu (Cantley, Scortechini). Kedah Peak (Ridley). Kelantan, Gunong Sitong (Nur). *Distrib.* Carimon isles near the waterfall. Lingga (Teysmann). Borneo, Matang (Hose).

Extremely plentiful where it grows, as thick as bracken.

## HYMENOPHYLLEAE.

### 8. **Hymenophyllum** Linn.

Small thinly membranous ferns with a slender creeping filiform rhizome. Fronds (simple) or compound; sori marginal on the end of a vein more or less sunk in the frond or exsert. Indusium inferior more or less deeply 2-lipped, receptacle elongate or columnar. Capsules orbicular attached by centre with a broad transverse ring opening irregularly at tip. Species numerous. Whole world.

(1) ***H. polyanthos*** Sw. Syn. Fil. t. 149. *H. Blumeanum* Spreng. Stipes slender not winged, fronds deltoid to lanceolate, 3 to 4 in. long, 1.5 to 2 in. wide, not crisped, main rachis narrowly winged, lower pinnae divided to rachis into several pinnules, ultimate segments linear, .1 to .15 in. long, and very narrow. Sori 2 or more to a pinna, terminal or axillary on both sides. Indusium small bivalved nearly to base, valves ovate rounded. *Hab.* Common on trees and rocks in the low country. Singapore, Bukit Timah; Bajau; Kranji (Ridley 5607). Johore, Gunong Pulai (Ridley). Malacca, Mount Ophir (Derry). Pahang, Tahan river

(Ridley). Perak, Bujong Malacca (Ridley). Penang Hill (Norris, Ridley 7072). Kedah Peak (Ridley) Gunong Bintang (Kloss).

var. ***Blumeanum.*** Fronds linear in outline the pinnae only .2 in. long often only simply pinnatifid. *Hab.* Common. Singapore, Bukit Timah (Matthew); Sungei Morai (Ridley 4406) and Bukit Mandai (8938). Pahang, Tahan river (Ridley). Selangor, Bukit Kutu (Ridley 7872). Perak (Scortechini). Penang (Norris, Kunstler 1536, Matthew, Maingay). Kedah Peak (Robinson and Kloss). Kelantan, Gunong Sitong (Nur).

var. ***microglossum.*** A dwarf form, frond and stipe 1.5 in. long .5 in. wide, pinnules rather broader and less deeply cut. Rare. Perak, Ulu Temengoh (Ridley 14200).

(2). ***H. australe*** Willd. Sp. Pl. v. 527. *H. javanicum* Spreng, Syst. iv. 132. Glabrous. Stipes 2 to 4 in. long edged with a crisped wing. Fronds 4 to 6 in. long compound 3 to 4 in. wide, triangular; main rachis winged, lower pinnae 1.5 to 2 in. long divided into several flat pinnules lower ones pinnatifid. Sori 6 or more on a pinna. Indusium as broad as segments lobed to base. Valves orbicular. *Hab.* Mountains from about 1000 feet upwards on rocks and trees. Johore, Gunong Pulai (Hullett); Malacca, Ophir (Ridley 9992). Pahang, Gunong Tahan (Ridley 15983). Selangor, Semangkok Pass (Ridley 8773, 8774). Perak, Hill Garden (Wray 580); Gunong Inas (Yapp 409).; Bujong Malacca (Ridley). *Distrib.* Indo-Malaya, Australia, New Zealand.

var. ***micranthum*** V. D. Bosch. Dwarf fern with ovate to lanceolate fronds, 2 to 3 in. long, 1.5 in. wide. Stipe 1 to 1.5 in. long conspicuously crisply winged as is rachis. Pinnae .5 in. long. The lobes in the upper part of the frond each bearing a sorus about as big as the frond, 10 to 11 on each pinna. *Hab.* Pahang, Telom (Ridley 13995); Gunong Tahan (Ridley 15983).

(3). ***H. badium*** Hook. and Bak. Syn. Fil. 60. Fronds taller and narrower, more linear in outline; pinnae short, 6 in. long, 1 in. wide; stipe very narrowly winged and hardly or not at all crisped, otherwise like *H. australe*. *Hab.* Perak, Bujong Malacca (Curtis 3357); Maxwell's Hill (Bishop Hose, Ridley 5182). Penang (Norris, Kunstler). *Distrib.* Indo-Malaya.

(4). ***H. demissum*** Sw. Schrad. Journ. 1800 p. 100. V. d. Bosch Hymenoph. Jav. 56, pl. xlv. Rather a tall plant. Stipe 2.5 in. long conspicuously winged half way, frond lanceolate, 6 in. long, 1.5 in. wide with many pinnae about 2 in. long, pinules with 3 or 4 lobes linear. Indusium ovate-lanceolate, narrowed upwards and sparsely toothed at tip. *Hab.* Singapore, Kranji (Ridley 1687). Perak, Maxwell's Hill (Wray). Kedah Peak (Ridley). *Distrib.* Java Philippines.

(5). ***H. dilatatum*** Sw. Schrad. Journ. 1800 p. 100. *H. eximium* Kze. Bot. Zeit, 1846, 478. Rhizome stout. Stipe 6 in. tall stout, frond 12 to 18 in. long, elongate lanceolate, 3 in. across; pinnae 2.5 in. long (the lowest as much as 5 in.), rachis winged, lower pinnae rhomboid-lanceolate divided nearly to rachis, pinnules rhomboid. Indusium terminal or axillary, ovoid blunt divided half way. *Hab.* Rare. Perak, Gunong Batu Putih (Kunstler 8045). Our biggest species. *Distrib.* Java, New Zealand, Polynesia.

(6). ***H. penangianum*** Matthew and Christ. Journ. Linn. Soc. xxxix. 214. Rhizome filiform branched shortly tomentose. Stipes black filiform rather stiff pubescent .8 in. long. Fronds oblong-ovate, narrowed at base, 3.5 in. long, 1 in. wide; rachis pilose free to the middle of the frond, above winged; frond pinnate or twice or thrice pinnate, pinnae alternate 6 to 8 on each side, pinnules 3 on each side, lower ones 2 or 3-fid; terminal lobes blunt; nerves black conspicuous. Sori chiefly in the axillae of the pinnae, rarely on the tip of the upper lobes, half inset, ovate; valves 2 clearly semi-ovate entire, receptacle thick exsert. *Hab.* Penang, Government Hill 2000 feet alt. (Matthew).

(7). ***H. Treubii*** Racib. Pterid. Buit. 15. Rhizome rather slender. Stipes filiform 1 in. long. Frond thin, membranous, rachis widely winged, 2 to 3 in. long, 1 to 2.5 in. wide. Pinnae simple or forked, linear blunt. Indusium ovoid-ellipsoid rounded terminal. *Hab.* Perak, 3000 feet (Bishop Hose); Lower camp Gunong Batu Putih 3400 ft. (Wray 1041). *Distrib.* Java.

This beautiful and very delicate fern has been confused with *H. rarum* and I believe with *H. dilatatum* by Beddome.

(8). ***H. rarum*** R. Br. Rhizome filiform; stipes rather distant filiform, very short, .2 to .4 in. long. Frond 2 in. long .25 in. wide, simply pinnate; pinnae over-lapping shortly 3 or 4-lobed, lobes entire broad, blunt, uppermost entire; nerves simply pinnate 1 to 4. Sori terminal on the upper lobes, globose ovoid blunt; lobes of indusium rounded entire. Columella not exsert. *Hab.* Kedah Peak (Robinson, Kloss 3992). Kelantan, Kwala Pertang (Haniff). Also almost certainly but sterile only, Selangor, Bukit Kutu (Ridley 7892). *Distrib.* Tasmania, New Zealand, Cape.

I put this down as *H. rarum* as in most details it is similar to forms of this species but it is very much smaller than the Tasmanian type in all parts.

(9). ***H. tunbridgense*** Sm. Sowerby Engl. Bot. i. 162. A small plant with rather long filiform rhizomes. Frond oblong-lanceolate 1 to 3 in. long, .5 in. wide, stipes winged above, main rachis winged throughout. Pinnae pinnatifid sub-flabellate lobes rather short spinulose. Indusium solitary axillary sub-orbicular.

*Hab.* Mountains. Perak, top of Gunong Batu Putih (Wray). Kedah Peak (Ridley 5178). *Distrib.* Europe, Asia, S. America in temperate climates and cool mountain tops in tropics.

(10). ***H. blandum*** Racib. Pterid. Buit. 20. A very small delicate species, rhizome filiform, stipes very slender .5 in. or less. Frond .6 in. long of very few often only 3 or 4 linear pinnae, branched or simple spinulose for the whole length rather closely. *Hab.* Perak, Gunong Hijau 4500 feet (Matthew).

(11). ***H. serrulatum*** Presl. *H. Smithii* Hook. Syn. Fil. p. 69 in part. Stipes 1 to 2 in. long, not winged. Fronds 3 to 4 in. long, 1.5 in. wide, bi-pinnatifid; pinnae oblong rachis winged, lobes linear simple or forked, serrulate. Sori 1 to 4 terminal on the lower lobes. Indusium oblong bi-valved halfway; lobes generally entire. Columella shortly exsert. *Hab.* Trees. Singapore, Kranji (Matthew). Johore, Gunong Belumut (Holttum). Pahang, Telom (Ridley); Fraser Hill (Burkill). Negri Sembilan, Ulu Pedas (Nur). Perak, Gunong Inas (Yapp); Gunong Kerbau (Robinson). Penang Hill (Ridley 7072.). *Distrib.* Philippines, Java.

var. ***integra.*** Frond as in *Smithii* but the lobes are quite entire; indusium oblong, lobes obscurely toothed; columella long exsert. *Hab.* Pahang, Telom (Ridley 13937); Wray's Camp, Tahan (Ridley 16207). Perak, Gunong Inas (Yapp 472); (Scortechini).

(12). ***H. holochilum*** C. Christ., Ind. Fil. 362. Rhizome slender, filiform. Stipes slender, usually hairy. Main rachis winged. Fronds lanceolate oblong. Pinnae cut down to the winged rachis into simple or forked pinnules linear blunt serrulate. Sori 1 to 4 on a pinna terminal, indusium ovate oblong, base obconic, valves blunt denticulate. *Hab.* Mountains; Johore, Gunong Pulai; Gunong Banang, Batu Pahat (Ridley) Sungei Berhidong (Holttum). Selangor, Semangkok. *Distrib.* Java.

(13). ***H. denticulatum*** Sw. Schrad. Journ. 1800, p. 100. Rhizome slender filiform. Stipes slender 1.5 in. long winged and spinulose above. Frond 1.5 to 2.5 in. wide or more or less deltoid, rachis broadly winged spinulose. Pinnae 1 in. long or less, pinnules 2 to 3-lobed, lobes broadly linear or oblong, all strongly spinulose. Indusium ovate serrulate. Columella prolonged. *Hab.* Singapore, Kranji (Ridley 1687). Johore, Gunong Belumut (Holttum). Malacca (Pinwill). Perak, Maxwell's Hill (Wray); Bujong Malacca (Curtis.). Kedah Peak (Ridley). *Distrib.* India, Java.

(14). ***H. aculeatum*** Van den Bosch Hymenoph. Javanicae, pl. xxxi. *H. sabinaefolium* Bak. Syn. Fil. p. 71. Rhizome filiform. Stipes 1 to 2 in. long, naked. Frond ovate or oblong, 1 to 2 in. long, and .5 to 1 in. wide, often much smaller; rachis winged with very numerous teeth. Indusium solitary spiny on the back.

divided half way down into ovate lobes. Columella prolonged little longer than the lobes. *Hab.* Negri Sembilan, Bukit Tangga (Nur). Perak, Larut (Kunstler 2403) rather tall form, fronds 3.5 in. tall (Scortechini); small fern fronds under 1 in. long Temengoh (Ridley 14217); Tapah (14014). Penang (Day). *Distrib.* Borneo, Java, Sumatra.

(15). ***H. Neesii*** Hook. Syn. Fil. p. 71. Rhizome filiform. Stipes 1 to 2 in. long, often hairy and spinulose winged about half way. Frond ovate or oblong 1 to 2 in. long, .75 to 1 in. wide, rachis winged and spinulose often very crisped throughout; pinnae simple or 1 to 3 times forked, deeply toothed. Indusium rather small supra-axillary on upper pinnae, sub-cylindric below divided more than half way, valves acute spinulose dentate. Columella prolonged beyond the indusium. *Hab.* Common on trees from low country to 4000 feet elevation. Singapore, Bukit Mandai (Ridley 9840); Kranji; Selitar. Johore, Pinerong; Tanjong Bunga (Ridley). Malacca, Mount Ophir (Ridley); Batu Tiga (Derry). Pahang, Tahan river (Ridley 2153); Ulu Semangkok. Negri Sembilan, Perhentian Tinggi (Ridley.). Dindings, Lumut. Perak, Maxwell's Hill (Curtis 2083); Bujong Malacca (Ridley 9610). Penang Hill, Penara Bukit (Ridley 7146). Kedah Peak (Robinson and Kloss). *Distrib.* Malay isles, Polynesia.

## 9. **Trichomanes** Linn.

Filmy ferns like *Hymenophyllum.* Fronds simple, lobed or pinnate. Sori marginal always ending a nervule. Indusium tubular mouth truncate or winged not distinctly 2-lipped as in *Hymenophyllum.* Columella filiform elongate and long exsert. Capsules at base sessile with a broad transverse ring, bursting vertically. *Distrib.* Whole world, very many species.

§ ***Hemiphlebium*** Fronds simple or slightly lobed.

(1). ***T. Motleyi*** Van den Bosch Ned. Kruidk Arch $5^2$ 145. Rhizome slender; fronds very small sessile or very shortly stalked, cordate orbicular, .15 in. wide; fertile fronds with a deep sinus with a midrib. Indusium stalked, mouth spreading much dilate. *Hab.* Dark damp forest on trees and rocks. Singapore, Bukit Timah; Stagmount (Ridley 10241). Perak, Foot of Gunong Bubu (Matthew). *Distrib.* Tenasserim, Ceylon, Malay isles to New Caledonia.

(2). ***T. Henzaianum*** Parish in Hook. 2nd Century of Ferns t. 1. Rhizome long filiform; fronds obcuneate, cut to near rachis into 5 to 7 linear blunt lobes and gradually narrowed at the base, a short stipe 1 in. long, .25 in. wide or narrower, midrib branching off to the lobes. Indusium terminal sunk in the frond, 1 to 6 on the tips of the lobes; mouth obscurely 2-lipped and columella hardly

exsert. *Hab.* On rocks and trees. Singapore, Bukit Timah, Fern valley, with *T. Motleyi* (Ridley 6684). *Distrib.* Burmah. Probably a variety of *T. Motleyi.*

(3). ***T. bimarginatum*** V. D. Bosch Ned. Kruidk. Arch. v. 2, 143. *T. neilgherrense* Bedd. F. S. I. t. 6. Rhizome slender creeping. Fronds up to 1 in. long, oblong not distinctly narrowed to the base blunt entire except some fertile ones with 3 very short terminal lobes bearing indusia. Indusium sunk in frond very obscurely 2-lipped. Columella long projecting. *Hab.* Perak, Larut. (Kunstler 2985, Scortechini). *Distrib.* S. India, Ceylon, Malaya, Australia, Polynesia.

(4). ***T. sublimbatum*** K. Muell. Bot. Zeit. 1854, 737. *T. muscoides* Bak. Hook. and Bak. Syn. Fil. 75 (not of Swartz). Rhizome slender. Fronds oblong narrowed to the base into stipes .1 in. long, lobed with short blunt lobes on each side, 1.25 in. long, .3 in. wide, tip narrowed, much less deeply lobed than *T. Henzaianum;* young fronds (sterile) rounded ovate, .25 in. long, entire passing gradually into the fertile fronds. Indusium sunk in the frond mouth free, dilate, but not 2-lipped. *Hab.* On rocks and trees in large mats. Singapore, Bukit Timah (Kunstler No. 338). Malacca, Mount Ophir (Ridley). Pahang, Fraser Hill (Burkill and Holttum) Perak, Bujong Malacca (Curtis 3358); Sira Rimau (Yapp 593). *Distrib.* India, Africa, America.

§ ***Gonocormus*** Fronds flabellate-digitate.

(5). ***T. parvulum*** Poir. Encyc. VIII, 64. Rhizome long slender. Stipes 1 in. or very much less. Frond .25 in. long and wide, obcuneate flabellate cut about half way down into narrow linear or oblong segments; nerves close, prominent. Sori 4 to 6 on the central lobe tips, Indusium sunk, mouth dilate at the sides. *Hab.* Perak (Scortechini). Penang Hill (Ridley 1748). Kedah Peak (Ridley). Pulau Adang (Ridley 15700.). *Distrib.* Mascarenes, S. India, Java, China, Japan, Polynesia.

(6). ***T. digitatum*** Swartz Syn. 370, 422. Rhizome and stipes filiform. Stipe 1 to 1.5 in. long. Frond .4 to 1.5 in. long of 2 to 5 lobes, linear sometimes simply branched, .5 in. long, .1 in. wide, olive green, glabrous, no nervules but one costa. Sori terminal 2 to 5. Indusium cup-shaped sunk, mouth dilate 2 lipped. *Hab.* On trees, Lowlands to 5000 feet, abundant in mountains on mossy tree trunks. Singapore, Kranji (Ridley). Pahang, Tahan river (Ridley); Fraser Hill (Burkill & Holttum). Selangor, Bukit Kutu (Ridley 7873). Perak (Scortechini); Gunong Hijau (Ridley) (Wray 1671); Gunong Inas (Yapp 451); Gunong Batu Putih (Wray 284). Kedah Peak (Ridley). *Distrib.* Ceylon, Mascarenes, Java, Polynesia.

(7). ***T. palmatifidum*** K. Muell. Bot. Zeit. 1854, 732. Rhizome slender branched, stipes scattered capillary pubescent 1 to 2 in. long. Fronds .5 in. long, digitate dichotomous, base cuneate or round, segments linear blunt minutely denticulate hairy; veins one in a segment. Sori terminal on the segments; indusium sunk obconic, ciliate. *Hab.* Mountains local. Pahang, Gunong Tahan (Robinson, Ridley). *Distrib.* Java, Papua.

§ ***Ptilophyllum*** Fronds pinnate.

(8). ***T. proliferum*** Bl. Enum. 224. Rhizome slender forming a mat. Stipes slender under 1 in. very slender. Fronds flabellate to linear oblong, simple or branched; lobes very narrow linear, .25 to 1 in. long, nervules irregularly branched. Sori about 4 terminal, tube sunk in frond, mouth obscurely 2-lipped, columella exsert. *Hab.* On mossy tree trunks. Selangor, Fraser Hill (Burkill and Holttum). Perak, Larut (Kunstler 2565); Ulu Temengoh. Penang, Penara Bukit (Curtis 3062); Top of Hill (Ridley 7148). Lankawi, Telaya Tujok (Haniff 1064). Kelantan, Temeyong (Haniff). *Distrib.* S. India, Ceylon, Java, Philippines.

(9). ***T. pallidum*** Bl. Enum. 225. Rhizome filiform, stipe very slender, 3.5 to 4 in. long. Frond blue-grey to whitish grey, obovate obcuneate to elongate lanceolate, 1.5 to 9 in. long, 1 to 1.25 in. wide; pinnules of broad linear lobes .25 in. long with costa but no nervules or very few. Sori 1 to 4 to a pinna terminal on short sub-axillary lobes, short cylindric oblong narrowed at base, mouth broad, columella exsert. *Hab.* On trees and banks. Singapore, Woodlands (Matthew). Johore, Gunong Pantai (Ridley 4161). Malacca, Mount Ophir (Ridley 9885). Pahang, Gunong Tahan (Robinson 5474). Perak, Gunong Hijau (Ridley); Gunong Kerbau (Haniff). Penang (Lady Dalhousie, Bishop Hose); Penara Bukit (Curtis 3062). Kedah Peak (Ridley); Gunong Bintang (Kloss). *Distrib.* Ceylon, Borneo, Java, Papua, Philippines.

(10). ***T. bipunctatum*** Poir. Encyc. VIII. 69. *T. filicula* Bory Dup. Voy. Bot. i. 283. Rhizome rather stout, tomentose elongate. Stipes 1 in. long slightly to distinctly winged usually glabrous. Frond oblong lobed to a winged rachis, lower ones pinnatifid. Sori 1 or 2 on a pinna, axillary or on the lowest lobes; tube sunk, rather long, 2-lipped, lips triangular round. *Hab.* On trees often on fallen trunks in dense lowland forest and rocks, Singapore, Chan Chu Kang. Malacca (Maingay). Negri Sembilan, Ulu Bendol (Holttum); Gunong Angsi (Nur). Pahang, Fraser Hill (Holttum). Selangor, Semangkok Pass (Machado 11560); Gunong Hitam (Ridley 8960); Batu Caves etc. Perak, Ulu Temengoh (Ridley 14205); Bujong Malacca (Curtis 3356); Larut (Kunstler 1913). Dindings, Lumut (Ridley). Kelantan Sungei Keteh (Nur). *Distrib.* India, Malaya.

(11). ***T. plicatum*** Bedd. F. B. I. t. 285. Rhizome slender. Stipes 2 in. long winged distinctly to base. Frond spreading 2.5 to 4 in. long; pinnae 1 in. long rather distant with distant linear acute lobes .25 in. long; rachis winged; costas prominent. Sori elongate axillary sunk in a much reduced lateral lobe, 2-lipped. *Hab.* Pahang, Telom (Ridley 13994). Malacca (Griffith). *Distrib.* Ceylon, Burmah.

Referred later by Beddome to a variety of *T. bipunctatum,* but totally different in appearance, size, form etc. from the typical plant described above, nor does it occur with it.

(12). ***T. auriculatum*** Bl. Fl. Jav. Fil. p. 225. Rhizome stout long creeping tomentose. Stipes none, frond leafy to base simply or 2-pinnate, 12 in. long, 3 in. wide; sterile frond with pinnules hardly lobed, fertile, oblong 1.5 in. long, rather deeply cut into short linear lobes, terminal segments flabellate or linear. Indusium free tubular on the ends of short lobes 4 to 8 on a pinnule, tube rather long, mouth truncate. *Hab.* Climbing on trees in forests in the hills. Pahang, Sungei Yet, Fraser Hill (Burkill). Selangor, Ginting Bidai (Ridley 7874). Perak, Maxwell's Hill (Curtis 3360); Gunong Batu Putih (Wray). *Distrib.* India, China, Malay isles.

(13). ***T. pyxidiferum*** Linn. Sp. Pl. 2, 1098. Rhizome moderately stout. Stipe 1 in. long not winged. Frond ovate oblong tripinnatifid, 2.5 in. long, 1.5 in. wide; pinnules closely shortly cut into short blunt linear lobes; main rachis winged. Indusium tube winged, mouth dilate but hardly 2-lipped. *Hab.* On tree trunks. Singapore, Bukit Timah (Ridley, Matthew). Johore, Sedenak. Selangor; Ulu Gombak. Perak, Goping (Kunstler 4185). Penang Hill, Penara Bukit (Ridley 7147). *Distrib.* Burmah, Borneo.

Perhaps a state of *bipunctatum.*

(14). ***T. radicans*** Sw. Fl. Ind. Or. 1736. Rhizome long moderately stout tomentose; stipes up to 6 in. long winged or not. Fronds up to 12 in. long and 6 in. wide, 3 to 4 pinnatifid main rachis winged; lower pinnae ovate rhomboid, lobes oblong. Sori lateral 1 to 4 to a pinnule, tube small more or less exsert, mouth truncate slightly lipped. *Hab.* On rocks. Johore, Patani, Batu Pahat (Ridley 10979). Sungei Ujong (Hullett). Perak, Maxwell's Hill (Ridley 5183, 1670); Gunong Batu Putih (Kunstler 8045). Penang Hill (Hullett). *Distrib.* Warm and temperate regions.

(15). ***T. hispidulum*** Mett. Kuhn. Linn. xxxv. 389. Tufted with few fronds. Stipe 8 in. tall, stout winged and sparsely hairy. Frond deltoid spreading lax, 6 to 12 in. long and nearly as wide, 4 pinnatifid, main rachis narrowly winged; pinnae oblong, pinnules oblong, lobes linear rather short blunt .05 in. long. Sori on upper part of terminal lobes. Indusium minute, funnelshaped, mouth

ciliate entire. Columella long. *Hab.* In swampy woods, Singapore, Chan Chu Kang (Matthew & Ridley). Selangor, Rawang (Kloss). Perak, Goping (Kunstler 531); Tapah near Kalindie (Curtis 3111). *Distrib.* Labuan, Borneo.

A rather fleshy succulent plant.

(16). ***T. maximum*** Bl. Enum. 228. Rhizome long creeping. Stipes stout 3 to 6 in. long, not winged. Fronds 12 to 18 in. long, 6 to 9 in. wide ovate 4-pinnatifid; pinnae lanceolate about 4 in. long, pinnules 1 in. or more cut into the linear lobes to the rachis, deep green. Sori 2 to 3 to a pinnule. Indusium cylindric, mouth dilate. *Hab.* In dense forests creeping on tree trunks up to 3000 ft. alt. Johore, Gunong Pantai (Ridley). Malacca (Hervey); Jeram Nyalas (Derry 1126). Negri Sembilan, Ulu Rembau (Nur). Selangor, Semangkok Pass (8638, 12032). Perak, Bujong Malacca (Ridley 534); Thaiping Hills (all collectors); Gunong Batu Putih (Kunstler 8045); Waterloo (Curtis 353); Gunong Kerbau (Robinson). Penang Hill 2500 ft. (Hullett). Lankawi, Gunong Raya (Haniff). *Distrib.* Burmah, Malay isles to New Guinea.

(17). ***Tr. javanicum*** Bl. Enum. Pl. Jav. Fil. 224. A glabrous tufted fern with no rhizome. Fronds crowded, 4 to 8 in. tall, nearly 2 inches long, blackish green. Stipes 2 in. or less hairy; pinnae simple oblong inaequilateral serrate 1 in. long, .2 in. wide; nerves numerous, conspicuous. Sori 1 to 4 or 5 on linear segments at the tip of the frond. Indusium free, mouth broadly dilate. Columella much exsert. *Hab.* Very common in lowland woods on the ground and on rocks, Singapore, Bukit Timah (Ridley 9569). Johore, Gunong Pantai, and Batu Pahat (Ridley 11065); Gunong Lambak (Holttum). Pahang, Tahan woods (Ridley). Malacca (Maingay); Mount Ophir (Wight's herb). Negri Sembilan, Gunong Angsi (Nur.). Selangor, Rawang; Bukit Hitam; Semangkok Pass (Ridley 8665). Dindings, Lumut (Ridley 7149a). Perak, Maxwell's Hill at 3000 feet (Scortechini 541); Goping (Kunstler 584). Penang Hill (Ridley 7149); Richmond Pool (var. *glabra* Bon.) (Burkill). Lankawi, (Curtis 2423); Gunong Chinchang; Telaya Tujoh (Ridley 15672), Pulau Adang (15699). *Distrib.* Chittagong, Burmah, Malay isles to New Guinea, Australia, Polynesia. *Use*: mixed with garlic and onions the dried fronds are smoked to cure headache.

(18). ***T. cupressoides*** Desv. Prod. 330. *T. rigidum* Hook. and Bak. Syn. Fil. 86, (not of Swartz). *T. setaceum* V. d. Bosch Kr. Arch $5^2$, 176. Tufted fern, no rhizome; fronds numerous. Stipes 2 to 8 in. hairy or glabrescent. Frond 6 in. long, 2.5 in. wide deltoid oblong 3 to 4 pinnatifid, rachis slightly winged or not at all; lower pinnae 2 in. long or less cut down to the rachis, pinnules deeply pinnatifid, lobes small linear. Sori 2 to 6 to a pinnule. Indusium small oblong narrowed below mouth which is

slightly dilate. *Hab.* Common in woods. Singapore, Bukit Timah; Sungei Buluh; Chan Chu Kang (Ridley 6119). Johore, Castlewood; Gunong Pulai (Ridley). Pahang, Tahan river (Ridley 2161) to Gunong Tahan. Malacca, Mount Ophir (Ridley 3332, 3320). Negri Sembilan, Gunong Angsi (Ridley 11815). Selangor, Batu Caves (Ridley 8661) Bukit Hitam (Kelsall); Bukit Kutu (Ridley 7871). Perak, Gunong Inas (Yapp 401). Kedah, Gunong Bintang (Kloss); Kedah Peak (Ridley). Penang (Maingay). Tringanu, Bundi (Rostados). *Distrib.* Indo-Malaya.

§ ***Leptomanes*** Fronds cut into capillary segments.

(19). ***T. gemmatum*** J. Sm., Journ. Bot. 3, 417. Hook. Syn. Fil. 87. Rhizome short woody with strong roots. Stipes stout wiry 3 to 6 in. long hairy. Frond 4 to 7 in. long, 1.5 to 2 in. wide pinnae suberect cut to rachis, pinnules with stiff linear filiform short lobes. Sori few minute axillary. Indusium turbinate mouth nearly truncate. The fertile fronds have terete lobes; sterile ones linear flat but narrow. *Hab.* Mountains 4000 feet alt. Malacca Mt. Ophir (All collectors). Perak (Scortechini) fide Beddome; Gunong Kerbau (Robinson). *Distrib.* Sumatra, Borneo, Philippines, Polynesia.

(20). ***T. parviflorum*** Poir. Encyc. 8, 33. *T. foeniculaceum* Bory in Willd. Sp. 5, 511. Rhizome short stout woody with powerful roots. Stipes rather stout, wiry, glabrous except at base, 6 in. long. Frond 4 to 5 in. long, 2.5 in. wide ovate lanceolate rachis terete; pinnae spreading cut down to rachis, pinnules pinnatifid with linear filiform segments, .1 in. long. Sori minute axillary 2 to 12 on a pinna, mouth of indusium not 2-lipped, spreading. *Hab.* Mountains Perak, Gunong Bubu (Murton). *Distrib.* Mascarenes, Borneo, Philippines, Australia.

Given as from Singapore, Moore's Herbarium, by Beddome but I have seen no specimen.

(21). ***T. Bauerianum*** Endl. Prod. Fl. Norfolk Isle 17. *T. apiifolium* Presl. Hym. 16, 44. Rhizome stout hairy. Stipes very stout hairy tufted 6 to 8 in. or more. Fronds 9 to 18 in. long, 4 to 8 in. wide, 4-pinnatifid; lower pinnae 4 to 6 in. long, 1 to 1.5 in. wide, lanceolate acuminate, pinnules cut into numerous very narrow linear flat segments. Sori small funnel-shaped. *Hab.* Malacca, Mt. Ophir (King's collector fide Beddome, but Kunstler never collected there). *Distrib.* Java, Philippines to Polynesia.

(22). ***T. pluma*** Hook. Ic. Pl. t. 997. Rhizome short stout red-hairy 3 to 4 in. long. Stipes slender 2 to 4 in. long redhairy. Frond 2.5 to 6 in. long lanceolate, pinnules .5 in. long crowded, pinnules cut into filiform bristle-like segments, .1 to .25 in. long spreading in all directions. Indusium stalked tube funnel-shaped, mouth truncate. Columella long. *Hab.* Common at 3000 to

4000 feet on mountains among moss. Malacca, Mt. Ophir (all collectors). Pahang, Gunong Tahan (Ridley 15988). Selangor Menuang Gasing (Kloss); Bukit Hitam; Ginting Bidai; Semangkok (Ridley 12107). Perak, Bujong Malacca (Ridley); Gunong Bubu (Cantley); Gunong Hijau (Wray 582); Gunong Kerbau (Robinson). Kelantan, Gunong Sitong (Nur). *Distrib.* Borneo, Philippines, Papua, Australia.

## DAVALLIEAE

### 10 **Odontosoria** Fée.

Tufted fern rhizome short. Fronds bi to tri-pinnatifid, lobes obcuneate nervules forked. Indusium forming a suborbicular or cup-shaped pouch on the end of the segments opening at top. Species 24, Tropics.

(1). ***O. chinensis*** J. Sm. Bot. Voy. Herald 430. Stipes slender dark brown, 6 to 12 in. long, fronds 12 to 18 in. long, 6 to 9 in. broad; pinnae 4 to 6 in. long, pinnules with 5 or 6 narrow obcuneate lobes, .15 in. long with 1 or 2 indusia at top. *Hab.* Stiff yellow clay or sandy spots. Pahang, Kwala Pahang (Ridley 4230); Tahan river; Fraser Hill (Burkill). Selangor, Ginting Bidai; Semangkok Pass (Ridley). Perak, Hill Gardens Thaiping (Wray 577). Penang, Penara Bukit etc. common (Norris, Maingay etc.). *Distrib.* Mascarenes, India, China, Japan, Polynesia.

The lace fern.

### 11 **Lindsaya** Dryand.

Small or medium ferns; fronds simply-pinnate to bi-pinnate; nerves free. Sori marginal or sub-marginal at the top of and uniting 2 nerves involucre double opening outwardly, inner valve membranous, outer formed of the margin of the frond. Species 90 all tropics.

**Fronds simply pinnate**

(1). ***L. repens*** Bedd. Ferns S. Ind. 72, t. 209. Rhizome long scaly creeping on trees. Stipes hardly any. Fronds linear-lanceolate 10 to 18 in. long, .5 in. to 1.75 in. wide pinnate; pinnae 40 or more deltoid oblong, lower edge straight or curved; upper shortly crenate, nerves simple and forked free. Sori short oblong numerous. *Hab.* Lowland woods to 4000 feet Singapore, Bukit Timah (Ridley). Malacca (Hervey). Selangor, Ginting Bidai (Ridley 7845); Semangkok (Ridley). Perak, Bujong Malacca (Ridley 9603); Thaiping Hills (Fox), Gunong Kerbau (Robinson). *Distrib.* Mauritius, Ceylon, India, Malay isles, Polynesia.

(2). ***L. concinna*** J. Sm. Journ. Bot. iii. 415. Rhizome short creeping. Stipes 1 in. long, wiry often flexuous. Fronds 2 to 3 in. long, .5 in. broad, simply pinnate; pinnae rather rigid oblong or broad obcuneate; lower edge straight or slightly curved

upwards; upper edge rounded entire, .18 in. long; petioles very short. Sori in a continuous line. *Hab.* Penang on a bank on the Hill road to the Crag Hotel (Curtis, Ridley). Setul, Bukit Wang (Haniff); a rather bigger form 4 in. tall; pinnae slightly lobed. *Distrib.* Malay isles.

(3). ***L. plumula*** Ridl. Rhizome long creeping rather thick, covered with red-brown lanceolate acuminate scales. Stipes 2 to 3 in. long, rather distant, dark red at base passing into straw-colour above. Frond 4 in. long, .2 in. wide, simply pinnate; pinnae numerous close coriaceous, narrowly blunt, lanceolate obcuneate, gradually narrowed to the rather long petiole which is continued as a conspicuous stiff edge on the curved lower edge. Upper edge straight, shortly lobed. Sori at the end of the lobes, 5 or fewer. Solitary on the terminal pinnae which are very narrow and long obcuneate. Rachis straw-coloured, grooved on the under side.

*Hab.* Pahang, Gunong Tahan at 5 to 6000 ft. alt. (Ridley 15997).

A remarkable little species, near *L. Loheriana* of the Philippines, with very narrow coriaceous fronds with a strong rib running along the lower edge of the pinnule.

(4). ***L. cultrata*** Sw. Syn. Fil. 119. Rhizome short, rather thick with numerous wiry roots. Stipes crowded 0 to 4 in. tall, slender. Fronds 3 to 6 in. long, .5 to 1 in. wide simply pinnate; pinnae unequal sided, lower edge nearly straight, upper slightly lobed .2 to .5 in. long, .15 to .2 in. wide, sessile or shortly petioled. *Hab.* On hills or mountains up to 7000 ft. alt. Johore, Pulau Tinggi (Burkill). Malacca, Mount Ophir (Ridley). Pahang, Tahan river (Ridley 2151). Selangor, Rawang; Ginting Bidai (Ridley 7876). Perak, Thaiping Hills (Kunstler 2473); Bujong Malacca (Ridley 9605); Temengoh (Ridley 14230 big form). Kedah Peak, Lankawi (Curtis); Setul, Bukit Rajah Wang (Haniff 1203). Kelantan Kwala Aring (Yapp 112); Kwala Krai (Haniff). *Distrib.* Indo-Malaya, Australia, Mascarenes.

(5). ***L. gracilis*** Bl. Enum. 217. Rhizome long, slender, brown glossy with few sparing scales. Stipes 3 to 4 in. tall. Frond simply pinnate 9 in. long, .5 to .75 in. wide, linear-lanceolate; leaflets triangular spreading membranaceous shortly stalked; base cuneate, lower edge nearly straight, upper edge curved with 2-4 rounded lobes. Sori 3 to 4 to a leaflet. *Hab.* Negri Sembilan, Bukit Tangga (Ridley). *Distrib.* Malaya.

(6). ***L. scandens*** Hook. Sp. Fil. i. 205, t. 63B. Rhizome long, climbing on trees with brown lanceolate acuminate scales. Fronds sessile linear simply pinnate, 12 to 15 in. long, 1 in. wide. Pinnae broad, oblong, blunt close set .5 in. long, .4 in. wide, both edges curved, upper edge entire. Sori in a continuous line. *Hab.* Common in forests. Singapore (Wallich 150). Johore, Sempang Kiri (Ridley); Gunong Pulai (Hullett). Pahang, K'luang

Terbang (Barnes). Malacca, Selandor; Sungei Hudang; Machap (Ridley). Selangor, Rawang (Kloss). Perak, Thaiping Hills (Hervey, Wray); Bujong Malacca (Ridley); Gunong Inas (Yapp 528). Penang Hill (Norris, Lady Dalhousie). *Distrib.* Malay islands.

**Fronds bipinnate**

(7). ***L. lancea*** Bedd. F. B. I. Suppl. 6. *L. trapeziformis* Dryand Tr. Linn. Soc. 43, t. 11. Rhizome long climbing. Stipe stout 12 in. long; frond bipinnate up to 15 in. Pinnae alternate distant 6 in. long, .6 in. to 1.5 in. wide, pinnules oblong blunt, both edges curved, upper edge entire. Sori in a continuous line round the upper margin. *Hab.* Common in forests. Singapore, Chan Chu Kang (Ridley 1653) Bukit Timah (Ridley 10815) Johore, Gunong Pantai (Ridley 4148); Hadgi Senawi (10967). Malacca. Mount Ophir (Ridley 3347). Selangor, Batu Tiga (Ridley). Negri Sembilan, Perhentian Tinggi (Ridley); Bukit Danan (Cantley). Perak, Ulu Selama (Yapp 612); Goping (Kunstler). Tringanu, Bundi (Rostado). Penang Hill (Hullett, Lady Dalhousie, Wallich 153). Kedah Peak (Ridley 5164). *Distrib.* Ceylon, Malaya, Trop. America.

(8). ***L. borneensis*** Hook. Syn. Fil. p. 107. Rhizome short covered with coppery acuminate scales. Stipes wiry polished 6 to 8. in. long. Fronds bipinnate 6 in. long with few linear-acuminate pinnae 8 in. long .25 in. wide, pinnules oblong trapezoid rounded coriaceous oblique .1 to .3 in. long getting smaller towards the tip; nerves forked conspicuous, upper edge curved, lower often nearly straight, inner edge quite straight. Sori in one line along the upper edge to near the tip. *Hab.* Woods, Singapore, Sungei Jurong (Ridley 9842); Woodlands (Matthew). Johore, Gunong Pulai (Ridley 12132). Pahang, Tahan River (Ridley). Perak, Thaiping Hills (Ridley 3062). *Distrib.* Borneo.

Some of Matthew's specimens have simply pinnate fronds.

(9). ***L. rigida*** Sm. Journ. Bot. 3, 415. Rhizome long branching terrestrial densely covered with copper coloured scales. Stipes slender, wiry 6 to 9 in. tall. Frond 4 to 8 in. long; pinnae distant 4 to 8 linear 6 in. long, pinnules stiffly coriaceous, trapezoid shortly petioled, lower edge straight or curved formed by the thick costa, upper edge shortly blunt-lobed; nerves very prominent beneath. Sori 2 or 3 joined together on the tip. *Hab.* Mountains, Singapore, Sungei Buluh (Ridley). Malacca, Mount Ophir (all collectors). Pahang, Gunong Tahan (Ridley 15957). Perak Gunong Inas (Yapp 513); Larut (Kunstler 100, 3086). *Distrib.* Papua.

Small forms with simple unbranched fronds and larger, more deeply lobed pinnules occur on Gunong Tahan and Gunong Inas.

(10). ***L. flabellulata*** Hook. Syn. Fil. p. 107. Rhizome short densely covered with brown scales acuminate. Stipes slender wiry,

tufted 4 to 8 in. Frond deltoid bipinnate 3 to 9 in. long and 2 to 6 in. wide; pinnae acuminate, pinnules rather thin obcuneate petioled distant on lower and inner side straight, upper side broad, round lobes about 4. Sori on the tips of the lobes about 4. *Hab.* Mountain districts 3000 to 6000 ft. alt. Pahang, Tahan river and Mountain. Malacca (Cuming 390); Mount Ophir Lobb, (Ridley 2349). Negri Sembilan, Gunong Angsi (Holttum). Selangor, Hulu Semangkok (Ridley). Perak, Gunong Kerbau (Robinson); Guong Batu Putih (Kunstler 8039); Gunong Inas (Yapp 404). Kedah Peak (Ridley 5163, 5165). *Distrib.* India, Ceylon, China, Japan, Malay isles, Australia.

This plant is very variable in most parts of its area, simply pinnate forms occur, as well as forms with very large pinnules, and again very finely cut forms. The variety *tenera* seems to be the commonest form here.

var. ***gigantea*** Stipes 10 in. long, frond deltoid of about 3 to 4 pairs of pinnae 3.5 in. long with about 6 round cuneate pinnules .5 in. long .3 in. wide with a narrow line of sori along the edge; at the base, the pinnae terminate with a lanceolate long-acuminate lobe 3 in. long, 1 in. wide at base edged by a broken line of sori on both sides. *Hab.* Penang (Matthew, Cantor, Norris). Selangor, Fraser Hill (Burkill and Holttum). Also at Borneo.

*L. dentata* Wall. is a dwarf simply pinnate form with the pinnules toothed. Singapore (Wallich 146).

(11). ***L. decomposita*** Willd. Sp. Pl. 5, p. 425. *Schizoloma lobata* Bedd. Ferns. Br. Ind. Suppl. 6. Rhizome short. Stipes dark brown, rather slender, 4-angled, 8 in. tall. Frond 6 in. long and wide; rachis angled, bipinnate or simply pinnate; pinnae 3. Pinnules oblong rhomboid blunt, lower edge curved denticulate or crenate, .5 in. long, .15 in. wide or larger in simple fronds; nerves prominent branched several times, sori along the edge of the lobes. *Hab.* Common in woods. Singapore, Bukit Timah (Ridley 9561). Johore, Gunong Pulai (Ridley 12131). Malacca (Cuming 394). Negri Sembilan, Senaling Inas (Holttum). Pahang, Tahan river (Ridley 2168); Fraser Hill (Burkill and Holttum). Perak, Thaiping Hills (Scortechini, Ridley 10670); Gunong Batu Putih (Wray 292); Gunong Kerbau at 4000 ft. (Robinson); Gunong Inas (Yapp 480). Penang (Norris). *Distrib.* Tropical Asia, Australia.

(12). ***Lindsaya davallioides*** Bl. Enum. 281. *Schizoloma davallioides* Moore Ind. xxxv. Rhizome short. Stipes slender, 6 in. long. Frond bipinnate with 6 to 7 pinnae 4 to 6 in. long 1.5 in. wide; pinnules .6 in. long, .25 in. wide oblong blunt, lower edges lightly curved, upper edge with 4 to 5 distant oblong blunt short lobes. Sori marginal on the lobes. *Hab.* Common in woods, Singapore, Bukit Timah (Ridley, Wallich 152). Malacca, Mount

Ophir (Ridley 3348, 3351). Pahang, Tahan river (Ridley 2179). Negri Sembilan, Gunong Angsi (Ridley). Perak, Thaiping Hills 4000 ft. alt (Scortechini); Gunong Batu Putih (Kunstler 8044); Ulu Selama (Yapp 1608). Penang (Norris). Kedah Peak (Ridley). *Distrib.* Malay isles.

### 12. **Schizoloma** Gaud.

Habit of *Lindsaya* but the veins often anastomose. Fronds simple or pinnate. Sori linear or linear-oblong uniting the apices of many veins. Indusium continuous attached on inner side of the sorus opening outwardly. Tropics and subtropics. Species 15.

(1). ***S. divergens*** Kuhn Chaetopt. 346. *Lindsaya divergens* Hook. and Bak. Syn. Fil. 109. Tufted fern with short rhizome. Stipes crowded, black, polished, wiry 3 in. long. Frond simply pinnate linear lanceolate 6 to 8 in. long with very many close set pinnae linear obtuse, coriaceous, 1 in. long, .25 in. wide, base shortly auricled. Sori narrow continuous line on both sides. *Hab.* Common in woods. Singapore, Bukit Timah (Ridley 4231a); (Bajau 4231); Pulau Ubin (Murton). Johore, Gunong Banang (Ridley 10970); Tanjong Kupang; Gunong Lambak (Holttum); Gunong Pulai (Burkill). Malacca, Batu Tiga (Derry) and Ayer Panas; Mount Ophir. Negri Sembilan, Gunong Angsi (Ridley). Perak, Maxwell's Hill (Scortechini). Penang (Norris). Tringganu, Bundi (Rostado). Kedah Peak (Ridley). *Distrib.* Borneo.

(2). ***S. Walkerae*** Kuhn Chaetopt. 346. *Lindsaya Walkerae* Hook. Syn. Fil. i. 209. Rhizome long, creeping with red scalelike hairs. Stipes often 12 in. slender dark purple black shining. Frond lanceolate, simply pinnate 6 to 12 in. long; pinnae coriaceous linear-lanceolate or lanceolate, blunt 3 to 5 in. long, .25 to .3 in. wide, nearly sessile strongly many nerved, base narrowed. Sori in a line along the edge on both sides. *Hab.* In watery places. Singapore, Tampinis (Ridley 26791) and Changi 6035. Malacca Mount Ophir (Ridley 3333). *Distrib.* Ceylon, Banca and Sumatra, Borneo.

(3). ***S. cordatum*** Gaud. Ann. Ic. Nat. iii. 507. Rhizome short, creeping. Stipes crowded, wiry 2 to 2.5 in. long. Sterile fronds ovate cordate, blunt, very coriaceous, strongly nerved, 2 to 2.5 in. long, 1 in. wide. Fertile fronds simple lanceolate-linear, 3 in. long, .25 in. wide strongly keeled, and 3 to 4-lobed, lobes linear; nerves strongly reticulate. Sori continuous undulating line along each edge. Rare. Malacca (Griffith). *Distrib.* Malay isles.

(4). ***S. ensifolium*** J. Smith, Journ. Bot. 3, 414. Rhizome short, slender with many thin, wiry black roots. Stipes rather stout shining purple black, 12 in. long. Frond simply pinnate of 4 to 18 linear-lanceolate thinly coriaceous pinnae quite entire; midrib prominent; nerves fine strongly reticulate 6 to 9 in. long,

.5 in. wide, shortly petioled. Sori continuous along the edge. *Hab.* Singapore (Kunstler 1179); Chan Chu Kang (Ridley 6033, 6028); Serangoon (Murton) Johore, Gunong Pulai (Ridley). Malacca (Griffith, Cuming.) *Distrib.* Africa, India, Polynesia.

(5). ***S. heterophyllum*** Dryand, J. Sm. Journ. Bot. iii. 414. Rhizome stout, short, woody. Stipes 4 to 8 in. long, stiff, pale. Frond 6 to 12 in. long, 3 (to 6 in.) wide lanceolate to deltoid, simply pinnate with deltoid or linear lanceolate entire pinnae, to bipinnate with erect patent branches 3 to 4 in. long, variously lobed. Sori in marginal lines continuous. *Hab.* Scarce, apparently chiefly an island plant. Singapore, Pulau Brani (Hullett); Pulau Tekong (Matthew). Pahang, Gunong Tahan, Teku (Haniff). Tringganu, Pulau Redang, (Yapp 303). *Distrib.* Mascarene isles, India, Malaya Hongkong.

**Excluded species**

*S. media* Br. Singapore, Pulau Ubin (Hullett) *S. Gueriniana* Gaud. Malacca, (fide Beddome.)

I have seen no specimen of this and Beddome does not say who collected it.

## 13. **Saccoloma** Kaulf.

Rhizome creeping, scaly. Stipes articulate. Sori round or oblong submarginal small in depressions. Indusium cuneate oblong, base acute, attached to base and sides. Species 8. Malayan, Polynesian and S. American.

(1). ***S. moluccana*** Mett. Kuhn. Verh. Zool. Bot. Ges. xix. 580. *Davallia moluccana* Bl. Enum. 237. Frond very large about 3 ft. long; primary pinnae 12 in. long; secondary pinnae 6 in. long lanceolate long acuminate sub-membranous, main rachis terete; rachis of secondary pinnae winged, pinnules .5 in. long decurrent, oblong, base narrowed free to rachis, upper edge strongly notched with short points, lower edge less notched; nerves prominent beneath, forked. Sori small in the notches 1 to 4 on a pinnule. *Hab.* Pahang, Telom (Ridley 14000). Selangor. Semangkok Pass (Ridley 8634). Perak, Thaiping Hills 3000-4000 ft. (Scortechini, Curtis 2085); Gunong Kerbau (Robinson).

## 14. **Humata** Cav.

Rhizome scaly and hairy. Fronds distant, coriaceous entire or pinnatifid; veins free. Indusium oblong reniform fixed by a broad base at the inner side, free at the sides, thick coriaceous. Species about 20. Tropical Asia and Polynesia.

(1). ***H. heterophylla*** Desv. Prod. 323. Rhizome long, creeping covered with long acuminate lanceolate scales. Sterile fronds lanceolate entire, 4 in. long, 1.5 in. wide, rather abruptly acuminate base broad, but shortly cuneate at extreme base. Stipe

1-1.5 in. long. Fertile fronds linear narrowed both ends, costa stout deeply pinnate 4 in. long, .25 in. wide, lobes short bearing 2 to 10 sori. *Hab.* Seashore, woods on trees, or on the ground in sandy spots. Common. Singapore, Kranji (Ridley 8940); Bajau; Changi beach (4355). Johore, Bukit Patani, Batu Pahat (Ridley). Pahang, Pekan (Ridley 2160). Malacca (Maingay); Tanjong Kling (Griffith). Perak, Lampatang (Scortechini 1554); Batang Padang District (Kunstler). Penang (Wallich 241). Kelantan, Temeyong (Haniff). *Distrib.* Siam, Java, Borneo, Papua, Philippines, Polynesia.

(2). ***H. Gaimardiana*** J. Sm. Lond. Journ. Bot. i. 425 *H. parallela* Brack. Expl. Exped. C. Wilkes, 16, p. 229. Rhizome long, covered with short broad lanceolate scales. Stipes rather slender 3 in. long. Frond ovate-lanceolate, 6 in. long, 1.75 in. wide cut into 40 linear blunt pinnae 1 in. long, .15 in. wide. Indusia numerous on the edge semi-orbicular in 2 lines, each pointing towards the tip. *Hab.* Sandy seashore woods. Singapore (Wallich 251); Tanjong Merawan (Ridley). Johore Tempayan River (Ridley 13277). Malacca, Tanjong Kling (Griffith). Pahang, Pekan (Ridley). Lankawi (Curtis.) *Distrib.* Nicobar and Andamans, Borneo, Amboina, Philippines, Polynesia.

(3). ***H. pinnatifida*** Bak. Journ. Linn. Soc. xxiv. 257. Rhizome long covered with long lanceolate acuminate scales. Fronds distant, elongate deltoid, narrowed to tip 3.5 to 4 in. long, 1.5 in. wide, pinnatifid nearly to rachis, lowest pair largest, deltoid lobed below. Stipes slender, 2 in. long. Indusia terminal on the nerves at the tip of the pinnae. *Hab.* On tree branches at 3500 to 4000 ft. alt. Malacca, Mount Ophir (Ridley). Pahang, Gunong Berumbun (Ridley 13940). Larut (Kunstler 6393). *Distrib.* Borneo.

(4). ***H. pedata*** Smith Tentam. Gen. Fil. 15. *H. repens* Diels Nat. Pfl. i. 4. 209. Rhizome rather slender with short ovate scales. Stipes rather slender wiry, 3 in. long, Frond 2 to 3 in. long, 1.25 in. wide at base, deltoid, pinnae cut nearly to base oblong blunt, .5 in. long, .25 in. wide, lowest pair bigger more deeply lobed, 2nd pair crenate, upper ones smaller. Indusia in rows on the ends of nerves in upper part of frond, semi-orbicular. *Hab.* Common in woods, Singapore, Kranji. Johore, Sungei Bau; Mount Austin. Malacca, Tanjong Kling (Ridley). Pahang, K'luang Terbang (Barnes); Teku woods, Gunong Tahan (Ridley 16004). Dindings, Lumut (Ridley 7155). Perak, Gunong Hijau (Wray 576); Gunong Inas (Yapp 455). Penang (Stolicza, Norris); Hill (Ridley 7077). Tringganu, Bundi (Rostados). Kedah Peak (Ridley 5179). Lankawi (Curtis). Kelantan, Kwala Endong (Haniff).

var. ***alpina*** A finely cut smaller variety, the fruiting pinnules rather deeply lobed. Malacca, Mount Ophir (Griffith). *Distrib.* Comoro isles, India, Ceylon, Malay isles, Australia. *Alpina* mountains of nearly all the region.

(5). ***H. angustata*** J. Smith, Journ. Bot. iii. 416. Rhizome rather stout densely covered with lanceolate acuminate scales. Fronds linear, edge crenulate narrowed at both ends, midrib prominent 4 to 8 in. long, .25 to .5 in. wide. Stipe .5 to 1.25 in. long. Sori in a row along each edge small on the ends of the forked nervules. Indusium transversely oval. *Hab.* Common on trees up to 3000 ft. Singapore (Wallich 242); Sungei Morai; Chan chu Kang (Ridley 3599). Johore, Bukit Pengaram, Kampong Bharu (Ridley). Malacca, Mount Ophir (Ridley 3336). Negri Sembilan, Gunong Angsi (Nur). Selangor, Semangkok Pass (Ridley 8647). Dindings, Lumut (Ridley 7136). Perak, Sungei Rayah (Kunstler 828); Maxwell's Hill (Scortechini 408); Bujong Malacca; Gunong Keledang (Ridley 9550); Ulu Selama (Yapp 605). Penang (Lady Dalhousie, Norris etc.); Waterfall (Ridley). Kedah Peak (Ridley 5179). *Distrib.* Borneo.

A deeply crenate form lobed to the midrib, grows on the rocks at Padang Batu, Ophir (Ridley 3339) and specimens with forked fronds occur.

**Excluded species**

*H. sessilifolia* Singapore (Sinclair and Moore's Herbarium according to Beddome) a most improbable locality.

## 15. **Leucostegia** Presl.

Rhizome long, creeping. Fronds membranous 3 to 4-pinnatifid, large ovate. Sori intra or submarginal. Indusium semi-orbicular adnate to frond by lower edge. Species about 20. Tropics.

(1). ***L. hymenophylloides*** Bedd. F. S. I. t. 152. *Davallia affinis* Hook. Sp. i. 158. t. 52B. Rhizome stout covered with dense lanceolate acute scales. Stipes over 12 in. long. Fronds 15 to 30 in. long or more, ovate-lanceolate membranaceous, 3 to 4 pinnate or quite decompound; pinnae 6 in. long lanceolate acuminate 2.5 in. wide, pinnules ovate deeply cut into ovate acute lobes subfalcate, fertile ones with a short tooth on the inner side. Sori small hemispheric about the middle of the lobe. *Hab.* On rocks and decaying trees, not common. Negri Sembilan, Ulu Pedas (Nur). Selangor, Semangkok Pass. Perak, Bujong Malacca (Ridley 9545); Gunong Batu Putih (Kunstler 8046) and Kinta 7128; Thaiping Hills (Haniff). Penang, Richmond Pool (Hullett, Lady Dalhousie). *Distrib.* Ceylon, Malay isles, Polynesia.

## 16. **Acrophorus** Presl.

Rhizome erect. Stipes tufted, not articulate. Fronds much divided, veins free. Sori roundish, submarginal terminal on a veinlet. Indusium broad ovate attached at inner side of the sorus free at sides opening outwardly. Species few, Indo-Malaya.

(1). ***Acrophorus nodosus*** Presl. Tent. 94 t. 3, f. 3. *A. stipellatus* Moore, Garden. Chron. 1854, p. 135. Rhizome short, thick covered with large ovate acuminate scales. Stipes long and stout, not articulate. Fronds large 3 to 5 feet long, tripinnate,; pinnae sessile oblong lanceolate, secondary ones pinnatifid, lobes obovate, base cuneate, tip round lower ones unequally bilobed. Sori on the fork of the nervules towards base of lobe. Indusium ovate cordate. *Hab.* Rare at 5000 to 5300 ft. alt. Perak, Ulu Bubong (Kunstler 7421); Gunong Inas (Yapp 446). *Distrib.* Himalayas, Java.

## 17. **Davallia** Sm.

Rhizome scaly or with rather long pointed scales. Stipes articulate with the rhizome. Fronds pinnate or bi-pinnatifid; veins free. Sori round or oblong. Indusium cup-shaped or semi-cylindric opening outwardly. Tropical or subtropical Old World. Species about 40.

### Fronds pinnate

(1). ***D. triphylla*** Hook. Sp. Fil. i. 162. Rhizome long, creeping stout, .25 in. through, branching, covered with hair-like appressed scales. Stipes 3 in. long. Frond coriaceous of 3 oblong lanceolate pinnae, the central one the longest 4 to 6 in. long, 1 in. wide, side ones about half as long or more. Sori very numerous along the edge close set sunk in the frond subcylindrical *Hab.* On branches of lofty trees, rarely low down. Singapore (Cuming 360); Woodlands; Bukit Timah. Johore, Bukit Patani, Batu Pahat (Ridley 11064); Gunong Pulai (Hullett). Negri Sembilan, Perhentian Tinggi (Ridley 10819). Perak, Gunong Batu Putih (Kunstler 8149).

### Fronds bipinnatifid

(2). ***D. pallida*** Mett. Kuhn Linn. xxxvi, 142. *D. Beccariana* Cesati Atti. Ac. Napoli, vii. 8. p. 14, t. 3, fig. 6. Rhizome rather stout with short, dense scales. Stipes stout 2 ft. long, pale. Frond large, thinly coriaceous, pale green when dry 18 in. long, 8 in. wide; pinnae 6 in. long, pinnules oblique oblong, lobes rounded oblong oblique, with strong but slender forked nerves. Fruiting ones more deeply cut. Sori broad, cup-shaped in a notch half way down the lobe. *Hab.* On rocks near water, rare. Perak, Sira Rimau 900 ft. alt (Yapp 574); Thaiping Hills (Curtis 3723). *Distrib.* Borneo, Polynesia.

A fine fern remarkably pale in colouring.

(3). ***D. corniculata*** Moore Ind. 292. *D. epiphylla* Bl. Enum. 235 (not Sprengel) Rhizome moderately thick, long, covered with broad lanceolate acuminate red scales (deciduous). Stipes distant 6 to 8 in. long. Frond lanceolate acuminate; pinnae in distant pairs 3 in. long, pinnules lowest lanceolate, lobes narrow short mucronate. Sori sub-marginal cup-shaped with the sharp mucro longer than them. *Hab.* Rare. Dense jungle on big trees and on rock faces 3000 to 4000 ft. Perak, Gunong Batu Putih (Kunstler 8037) and Larut (4124). *Distrib.* Java.

(4). ***D. Lorrainii*** Hance Ann. Sc. Nat. Ser v. vol. v. 254. Rhizome .15 in. thick covered with black bristles, covered with rather long grey hair. Stipes 3 to 4 in. tall, wiry. Frond deltoid, 8 in. long, 12 in. wide at base, the lowest pinnae much the longest with secondary pinnae 2. 5 in. long, pinnules .5 in. long with oblong acute short lobes cut nearly to base above, and decurrent on the winged rachis below. Sori ellipsoid below the top of the lobes. *Hab.* On rocks in mountains. Perak, Gunong Inas (Yapp 415). Penang (Norris and Dr. Lorraine). Kedah Peak on a precipice at 4000 ft. (Ridley 5158, Robinson) *Distrib.* Philippines.

(5). ***D. bullata*** Wall. Cat. 258. Rhizome long, stout, densely covered with red lanceolate acuminate caudate scales. Stipes remote, stiff 4 in. long. Frond coriaceous, deltoid acuminate, 6 to 8 in. long, 6 in. wide at base; pinnae long pointed, lowest deltoid stalked, the stalks not decurrent on the terete rachis, pinnules oblong not decurrent, lobes oblong blunt, small in fruiting frond. Sori cup-shaped nearly covering the lobe which has two unequal projecting points.. *Hab.* Epiphytic in mountains 3 to 5000 ft. alt. Pahang, Fraser Hill (Burkill & Holttum). Perak, Thaiping 3500 to 4500 ft. alt (Kunstler 8310, 6381); Hill Garden (Wray 96). *Distrib.* India, China, Japan, Malay isles.

(6). ***D. divaricata*** Bl. Enum. 237. Rhizome long, creeping covered with lanceolate caudate chestnut scales. Stipes strong, 6 to 12 in., black. Fronds submembranous tripinnatifid 3 ft. 6 to 8 in. long (Kunstler) with distant pinnae lanceolate acuminate with slender rachis, pinnules 1. 5 in. long lanceolate, cut down about half way, lower ones deeper. Sori cup-shaped, broad well below the edge. *Hab.* Not common, Singapore (Lobb, more likely Penang). Perak, Larut 3000 to 3200 ft. (Kunstler 3659, Scortechini). Penang (Lady Dalhousie, Norris). *Distrib.* Java, India, Hongkong.

(7). ***D. solida*** Sw. Schrad. Journ. 1800, 87. Rhizome long creeping stout, covered with densely imbricate acuminate scales. Stipe strong, 6 to 24 in. long. Frond coriaceous, deltoid, 3 to 4 pinnatifid 1 to 2.5 feet or more long and wide; pinnae lower lanceolate acuminate or broad lanceolate oblique, very variably cut the lobes often quite narrow, often broad oblong. Sori on both

sides of the lobes on the edge linear-oblong sunk in the frond with a small process on the outer side or O. *Hab.* Common, chiefly at the foot of trees in sandy places and on tree trunks. Singapore Botanic Gardens; Sungei Morai (Ridley); Bukit Panjang (Matthew). Johore, Jaffaria (King); Pahang. Malacca (Griffith). Selangor, Ginting Bidai (Ridley 984). Dindings, (Finlayson, Wall. 1246). Perak, Kinta (Kunstler 7068). Penang, Waterfall (Curtis 3355). Kedah Peak 3800 ft. alt (Robinson). *Distrib.* Mascarenes, Tenasserim, Cambodia, China, Malay isles, Australia, Polynesia.

The broad-lobed form or rather state is *D. ornata* Wall. It grows with the finely cut form *D. caudata* Wall.

(8). ***D. elegans*** Hedw. Fil. Gen. & Sp. 1803. Rhizome long, stout, .25 in. long densely covered with red hair-like scales. Stipe 6 to 8 in. long, strong. Fronds 1 to 2 ft. long and nearly as wide, deltoid tripinnatifid, coriaceous, pinnules lanceolate cut into oblong lobes to the rachis, many false nerves. Sori several to a segment marginal, but with a lateral projecting tooth longer than them. Indusium cup-shaped. *Hab.* Common on trees or sandy spots, Singapore, Changi beach (Ridley 4351). Malacca, Pulau Undan (Cantley), Jasin (Goodenough). Pahang, Pekan; Kota Glanggi (Ridley). Selangor, Semangkok Pass (Ridley); Gunong Mengkuang (Kloss). Perak, Thaiping Hills, Cottage (Hervey). Province Wellesley, Permatang Bertam (Ridley). Penang (Norris). Tringganu, Cherating River (Ridley), Kedah Peak (Ridley 5159). *Distrib.* Africa, India, China, Malay isles, Polynesia. *Native name.* Paku Terutep.

Usually now made a variety of *D. solida* but it is more finely cut with a red orange scaly rhizome.

(9). ***D. parvula*** Wall. Cat 247. *Leucostegia parvula* Sm. Loud. Journ. Bot. i. 426. Rhizome slender long intricate covered with lax subulate scales. Frond deltoid tri-pinnatifid rigid, dark green, .5 in. long and wide, very finely cut into very narrow linear acute lobes. Stipes 1 in. or less long. Sori in sinus of forked lobes. Indusia broader than the segments. *Hab.* On trees in mangrove swamps. Singapore (Wallich 247); Kranji (Ridley 87). *Distrib.* Borneo. Java, New Guinea.

## 18. **Microlepia** Presl.

Rhizome creeping, hairy or fibrillose. Stipes not articulate. Fronds pinnate to pinnatifid, lobes rhomboid oblong or linear triangular. Sori round or oblong solitary, terminal on veins. Indusium half cup-shaped or semi-cylindric attached at base and sides, open at outer edge. Receptacle distinct. Species 27. Tropics.

(1). ***M. speluncae*** Moore Ind. xciii. Rhizome creeping. Stipes stout 1 to 1.5 foot long. Fronds 3 to 4 feet long, 1 to

2 feet wide ovate to deltoid, 3 to 4-pinnatifid hairy, membranous; pinnules oblong to narrow linear lanceolate, 1.5 to 2.5 in. wide lobed to base, lobes oblong narrowed at the base, with about 12 teeth. Sori large 1 to 5 on a lobe. Indusium cup-shaped hairy. Hab. Very common in shady places. Singapore, Changi (Ridley 6034); Gelang (6248), (Wallich 262). Johore, Tebing Tinggi (Ridley). Pahang, Kwala Tahan. Selangor, Batu Caves (Ridley 13437); Bukit Kutu (Ridley 7860); Ginting Bidai (7855). Perak, Ulu Temengoh (Ridley 14220); Thaiping (Kunstler 8391). Penang, Penara Bukit (Curtis 3061). Prov. Wellesley, Tasek Gelugur (Ridley). Kedah, Gunong Geriang (Ridley 14762); Alor Star (14762). Kelantan, Kamposa (Ridley). Lankawi (Fox). Perlis (Matthew). *Distrib.* Trop. Asia and Polynesia, America.

Rather variable; our commonest form seems to be Beddome's var. ***hirta.*** Some forms from Kelantan and Penang Hill (Ridley 7138) are quite glabrous.

var. ***rhomboidea.*** Fronds 8 feet long; stipes very stout; pinnules sub-coriaceous with broad short rounded lobes. *Hab.* Singapore (Norris). Perak, Larut 4000 to 5000 feet (Kunstler 5013). *Distrib.* Tropics generally.

(2). ***M. strigosa*** Presl. Epim. 95. Fronds tall lanceolate bipinnate. Stipes tall; rachis and veins hairy; primary pinnae petioled lanceolate acuminate, secondary sub-dimidiate ovate, lobes obovate. Involucres half cup-shaped. *Hab.* Selangor, Rawang; Ginting Bidai (Ridley). *Distrib.* Trop. Asia.

Clarke considers this a form of *speluncae.* It is not 2 to 4-pinnate as that species, but only bi-pinnate.

(3). ***M. Kurzii*** Clarke Ferns of Northern India p. 446. Fronds 4 to 6 feet long tri-pinnatifid. Stipes stout smooth pale. Fronds 2 to 3 in. distant, membranous; pinnae 12 to 15 in. long, 6 to 9 in. wide, pinnules 3 in. long, 1 in. wide cut half way into broad rounded lobes rachis hairy; fertile pinnae cut to rachis lobed and decurrent, hairy beneath, and smaller. Sori 2 to 8 to a lobe rather large just below a tooth. *Hab.* Dense Jungle up to 3000 feet. Perak, Ulu Temengoh (Ridley 14208); Gunong Bubu (Kunstler 8331); Thaiping Hills (Kunstler 2397). *Distrib.* Burmah.

## 19. **Tapeinidium** Christensen.

Rhizome creeping fibrillose or scaly. Stipes distant not articulate with rhizome. Fronds bipinnate or pinnate; leaflets linear lanceolate. Sori round terminal on veins, single or paired. Indusium cup-shaped attached at the base, open at the edge. Species 5 or 6. Malaya, Polynesia.

(1). ***T. pinnatum*** Chr. Ind. 213. *Davallia pinnata* Cav. Descr. 277. Rhizome creeping woody covered with fibre like scales.

Stipes wiry and strong 8 in. long. Fronds 9 to 15 in. long, 4 to 6 in. wide lanceolate, pinnate; pinnae linear acuminate, 4 in. long, .25 in. wide crenate along the edges. Sorus 1 to a lobe small submarginal, nerves sunk forked. Indusia small, cup-shaped. *Hab.* Banks on mountains, not rare. Johore, Gunong Pulai (Ridley); Gunong Belumut (Holttum). Malacca, Mount Ophir (Ridley 3318). Negri Sembilan, Gunong Angsi (Nur). Selangor, Bukit Hitam (Ridley); Semangkok Pass (8660). Perak, Thaiping Hills; Gunong Keledang (Ridley 9541) and Bajong Malacca (9533). Penang Hill very abundant at the top (all collectors); Mount Elvira. Kelantan, Gunong Sitong (Nur).

Var. ***luzonica*** Bedd. *Davallia luzonica* Hook. Sp. 174, t. 60B. Lower pinnae pinnate with numerous linear pinnules 1.5 in. long or less. *Hab.* Pahang, Gunong Tahan, Wray's Camp (Ridley 16200). Perak, Larut (Kunstler 2144). *Distrib.* Malay Archipelago, Polynesia.

## PTERIDEAE

### 20. **Adiantum** Linn.

Slender tufted ferns. Fronds simple to multi-pinnate, herbaceous, pinnules round cuneate or oblong. Sori marginal, globose oblong or linear. Indusium of the same shape formed of the reflexed edge of the frond the capsules beneath it; nerves free. Whole world. The commonly cultivated maidenhairs are *A. tenerum* Sw. *A. concinnum* H. B. K. *A. cuneatum* Hook. *A. aethiopicum* Linn. Species numerous.

(1). ***A. caudatum*** Linn. Mantiss. 308. Stipes rather stout dark brown deciduously hairy 4 in. long. Fronds simply pinnate, 6 to 12 in. long, 1.5 in. wide; pinnules somewhat coriaceous oblong rhomboid, lower edge straight, upper edge straight shortly bluntly cut into truncate lobes, .5 to .75 in. long, .25 to .3 in. wide petiole very short. Tip of frond prolonged and rooting. Sori about 5, roundish or oblong. *Hab.* Usually on limestone rocks. Singapore, Bukit Timah (Murton). Selangor, Batu Caves (Ridley 8142). Perak, Bukit Kupayiang near Sungei Siput (Ridley); Gunong Tundok (Kunstler 8351); near Ipoh (Curtis 3361). Kedah, Gunong Geriang (Ridley 14766). Setul, Bukit Bunga (Ridley 4768). Perlis, Kanga (Ridley 14767). *Distrib.* Old world tropics.

The Batu Caves and Bukit Timah plants have the pinnules deeply cut into linear lobes.

(2). ***A. lunulatum*** Burm. Fl. Ind. p. 235. Stipes 4 to 6 in. long, dark chestnut brown polished. Fronds 6 to 12 in. long simply pinnate, often slender and rooting at tip; pinnules oblong curved, lower edge nearly straight; upper curved shortly broken into 5 or 6 broad truncate lobes 1 in. long. .3 in. wide tip truncate

or blunt, petiolule slender .2 in. Sori oblong, 5 to 6 along upper edge. *Hab.* Shady places. Perak, Temengoh (Ridley 14234). Penang, Balik Pulau (Curtis). Kelantan, Kota Bharu in an old well. Lankawi (Fox). *Distrib.* Tropics both worlds.

(3). ***A. capillus-veneris*** Linn. Sp. Pl. ii. 1096. Tufted fern rhizome very short with chestnut scales. Stipes slender black polished up to 9 in. long. Frond 6 to 12 in. long bipinnate, pinnules obovate or semi-orbicular, upper edge crenulate rounded base broad straight or cuneate, .3 to .5 in. long and about as wide petioles about .1 in. long capillary. Sori along the upper edge 4 or 5. *Hab.* On rocks, usually near the sea. Singapore, Changi roadside. Pahang, Tahan river (Ridley 2173). Kedah, Pulau Song Song (Ridley 5155). Lankawi, Burau Bay (15788). Adang group, Pulau Rawei (15705) and Pulau Tengah (15715). *Distrib.* Whole world.

(4). ***A. stenochlamys*** Bak. Ann. Bot. 5, 209. Rhizome short stout. Stipes 1 to 2 in. to 6 in. tall, black. Fronds bi-tripinnate, 6 in. long and wide; pinnules fan-shaped base broad shortly narrowed at tip to cuneate, .3 in. long, .5 in. wide. Sori 4 linear separate or nearly continuous. *Hab.* Singapore, tombs in the old cemetery. Malacca, walls of old chapel (Ridley). *Distrib.* Borneo.

(5). ***A. flabellulatum*** Linn. Sp. Pl. ii. 1095. Rhizome short covered with long chestnut scales. Stipes 6 to 8 in. polished black. Fronds bi-partite pedate tri-pinnate, 6 in. long and 9 wide; secondary pinnae few, pinnules subcoriaceous, semi-orbicular obcuneate, upper edge rounded, corner denate, slightly crenulate .3 to .4 in. long, petioles very short. Sori large as long as the lobes of the fertile frond. Indusium oblong hard. *Hab.* Rocks near the sea. Singapore, Pulau Ubin, rocks by the sea. (Ridley 865). Malacca, Cape Rachado (Hervey). *Distrib.* Trop. Asia, China, Japan.

## 21. **Hypolepis** Bernh.

Rhizome creeping. Stipes not articulate to rhizome. Fronds divided herbaceous more or less hairy, veins free. Sori round or oblong, sub-terminal on the veins on a thickened receptacle submarginal solitary at the tops of the sinuses of the ultimate segments, protected by small reflexed round lobes too small to cover them permanently. Species about 30. All tropics.

(1). ***H. punctata*** Bedd. Handb. Supp. 19. *Phegopteris punctata* Mett. Ann. Lugd. Bat. i. 222. Rhizome long large. Fronds 4 to 6 feet long and very broad, quadri-pinnatifid, rachis strigose pinnae herbaceous 2 feet long and over 12 in. wide at base; petioles 2 in. long; secondary pinnae lanceolate 6 to 8 in. long; tertiary pinnae 1.25 in. long cut down nearly to the base into 10 to 12 oblong blunt segments shortly bluntly lobed glabrous, a few

white hairs on tertiary rachis and midrib. Sori in the axils of the 2 lower lobes. *Hab.* Mountain forests. Malacca, Bukit Kandang (Cantley). Selangor, Ginting Bidai; Rawang. Perak, Larut Hills 4400 to 5000 feet (Kunstler, Bishop Hose); Caulfield's Hill (Scortechini); Maxwell's Hill (Fox). Penang, Balik Pulau. Kelantan, Kwala Krai (Haniff).

*Native name* Paku Resam Paya. *Use*: Fronds used for poulticing boils.

(2). ***H. tenuifolia*** Bernh. Schrad. New Journ. 1806, p. 34. Rhizome densely clothed with fibrils. Stipes long, covered with dense red viscid hairs as are the rachis and branches of the pinnae. Fronds large spreading 4-pinnate, 3 to 10 feet long, a foot wide pinnae 6 in. long, pinnules alternate, 1.5 in. long acuminate; lobes .2 in. long shortly bluntly lobulate, basal upper lobule larger than the others. Sori oblong. *Hab.* Mountains, rare. Pahang, Fraser Hill reservoir crest, very abundant in the open on a quartzite ridge (Holttum). *Distrib.* Malay islands, China, Australasia Polynesia.

## 22. **Cheilanthes** Sw.

Tufted terrestrial ferns rarely over a foot tall, 3 to 4-pinnatifid subcoriaceous, veins free. Sori terminal on veins, at first small sub-globose, later confluent. Indusium of the altered reflexed margin. Species numerous: whole world but chiefly America.

*C. farinosa* Kaulf. and its variety *chrysophylla* the silver and gold ferns are common in cultivation.

(1). ***C. tenuifolia*** Sw. Syn. 129. Rhizome creeping scaly short. Stipes up to 8 in. long, purple black. Frond 3 to 6 in. or more tri-pinnate, pinnules very small deeply lobed to rachis about .25 in. long. Sori numerous crowded nearly covering the lobules. *Hab.* Common on dry banks, and in cultivated ground. Singapore, (Wallich) Pulau Ubin; Sungei Brih. Malacca (Maingay); Ayer Keroh, Kesang. Negri Sembilan. Perak, Ulu Selama (Yapp 621). Penang, Penara Bukit; Pulau Tikus. Prov. Wellesley, Tasek Gelugur. Lankawi, Telaya Tujoh (Ridley 5674). Kelantan, Kota Bharu ricefields (Ridley). *Distrib.* India, Malaya, Australia, New Zealand. *Native names* Paku Telor B'lankas; Paku Resam Padi; Paku Resam Lumut.

## 23. **Plagiogyria** Kze.

Coriaceous ferns with the habit of *Lomaria*, but the capsules have an oblique ring, and the base of the stipe is suddenly dilate fleshy triquetrous and furnished with large spongy glands. Species 12. Trop. Asia, and America.

(1). ***P. euphlebia*** Kze. Bot. Zeit. 1848, p. 21. Stem stout woody. Stipes 12 in. or more. Fronds sterile oblong or ovate lanceolate 1 to 2 feet long, 6 to 12 in. wide; pinnae subcoriaceous

lanceolate linear narrowed to tip, base slightly narrowed petioled 3.5 in. long, 1 in. wide. Fertile pinnae narrow linear acuminate 4 in. long, .1 in. wide. *Hab.* Mountains. Pahang, Gunong Tahan (Ridley 15992). Perak, Gunong Bubu (Wray 3852). *Distrib.* India, Japan, Australia.

(2). ***P. pycnophylla*** Kunze Bot. Zeit. iv. p. 143. Stem erect short woody. Stipes sub 4-angled 2-furrowed above. Fronds 1 to 2 feet or more long; pinnae sterile numerous linear acuminate, base broad short petioled, tip serrate, subcoriaceous 5 in. long, .75 in. wide; nerves conspicuous parallel, sub-coriaceous; fertile pinnae 3 in. long, .15 in. wide densely covered (except midrib) to tip with capsules. *Hab.* Mountains. Perak, Gunong Bubu 5000 to 5500 feet (Kunstler 7324); Gunong Inas 4000 ft. (Yapp 449). Penang (Norris). *Distrib.* India, Malaya.

## 24. **Doryopteris** Sm.

Rhizome creeping. Frond pedately lobed or ovate or deltoid cordate coriaceous, nerves copiously anastomosing. Species 38. Tropics, chiefly American.

(1). ***D. ludens*** Wall. Cat. 88. Rhizome rather long covered with chestnut lanceate scales. Stipes black shining. Sterile fronds triangular with deflexed basal lobes. Stipe 3 to 4 in. Fertile frond stipe 18 in. long, frond 4 to 6 in. long and wide, cut into 5 to 7 lanceolate acute lobes. Sori continuous all round the edge. *Hab.* On limestone rocks. Selangor, Batu Caves (Ridley 8135). Perak, Batu Kurau (Scortechini). Perlis, Bukit Lagi, Kanga (Ridley 14761). Setul (14760).

## 25. **Histiopteris** Ag.

Rhizome far creeping. Stipes purple shining not articulate. Fronds bi-pinnate or tri-pinnate large simple or lobed; lowest pinnulae shorter than the next, stipule-like. Sori linear on a receptacle connecting the vein tips. Indusium linear of the reflexed edge. Species 2. Tropics.

(1). ***H. incisa*** Sm. Hist. Fil. 295. *Litobrochia incisa* Presl. Tent. 149. Scrambling glaucous fern with a long creeping rhizome. Stipes chestnut glossy. Fronds distant ovate sub-coriaceous; pinnae 6 in. long in distant pairs, lobes free to base lanceolate oblong 1 in. by .25 in., base broad. Stipuliform pinnae triangular short lobed at base of branch of pinna. Sori in a line along the edge of each lobe.

var. ***integrifolia*** a form with the pinnae reduced to a simple lobe 4 in. long by .75 in. wide or with 1 to 5 linear falcate lobes 3 in. long, .5 in. wide acuminate. *Hab.* Mountains, both forms grow together. Singapore, Tanglin, Holland road? escape. Johore,

Tanjong Kupang (Ridley). Pahang, Fraser Hill (Burkill and Holttum). Perak, Thaiping Hills (Kunstler 2363) (Wray 69 and 98); Gunong Kerbau (Robinson). *Distrib.* All tropics.

### 26. **Onychium** Kaulf.

Tufted ferns. Fronds finely cut pinnatifid. Sori on a continuous linear receptacle connecting the tips of several nerves. Indusium parallel with the edge of the lobe linear pressed down over the edge, quite covering the under side of the lobe. Species 6. All tropics.

(1). ***O. auratum*** Kaulf. Enum. 144. Stipes yellow or pale brown, 6 to 12 in. long. Sterile frond very finely cut over 12 in. long, 6 in. wide, 4-pinnatifid, pinnules and lobes very numerous, lobes very small .1 or less, fertile lobes linear .3 to 1 in. long, .1 in. wide, thickly covered with yellow capsules. *Hab.* Malay peninsula (Norris).

No locality given and probably cultivated. *Distrib.* India, Burma, Malay isles, Formosa.

### 27. **Pteris** Linn.

Ferns with usually rather short rhizome simply to 3-pinnatifid lobes usually linear; nerves simply forked. Sori marginal linear continuous. Indusium linear covering it then spreading. Whole world. Species numerous.

(1). ***P. longifolia*** Linn. Sp. Pl. 1531. Stipe 6 to 12 in. long pale with brown linear scales at base. Fronds 12 in. to 2 feet long 4 in. to 9 in. wide oblong lanceolate, narrowed at both ends, simply pinnate, pinnae sessile 40 to 60, 3 to 6 in. long linear entire, base truncate cordate sub-coriaceous. *Hab.* Common on walls and dry spots. Singapore, aqueduct near reservoir etc. Johore, Batu Pahat (Ridley). Malacca on the old chapel; Mount Ophir (Ridley). Selangor Batu Caves (Ridley 8145). Perak, Kwala Dipang (Ridley 9549) Bukit Kupayiang, Sungei Siput (Ridley). Penang (Ridley 7079 Lady Dalhousie). Tringganu, Bundi (Rostados). *Distrib.* Whole world. *Native name* Paku Uban Bukit.

(2). ***P. stenophylla*** Wall. Hook. and Grev. Ic. Fil. t. 130. *P. pellucida* Presl. Rel. Haenk. 55. var. *stenophylla* Bedd. Handb. Ind. Ferns, 107. Rhizome short, stout, woody. Stipes 6 to 12 in. or more. Fronds 6 to 12 in. long, pinnate, sterile, lower pinnae split to near base; pinnae 4, lanceolate linear undulate at edge, 6 to 12 in. long, .5 to 1 in. wide closely nerved. Fertile narrow linear, lower often 2-lobed, 6 in. long, .25 in. wide. *Hab.* Local. Negri Sembilan, Gunong Angsi (Nur). Perak, Gunong Inas 3600 feet alt. (Yapp 462); Gunong Bubu 3000 feet alt. (Murton). Penang (Norris); West Hill 2500 feet (Curtis 998, Matthew). *Distrib.* India, Malay isles.

(3). ***P. cretica*** Linn. Mant. p. 130. Stipes usually short to 6 in. or more, wiry straw-colored. Fronds 6 to 12 in. long, 4 to 8 in. wide; pinnae few linear 3 to 6 in. long, .25 in (fertile) to .5 in. wide (sterile), the lowest cleft nearly to the base into 2 linear pinnules, coriaceous. *Hab.* Not common and usually a peculiar stiff grey form. Johore, Gunong Pulai (Ridley, Hullett) Selangor, Semangkok Pass (Ridley). Perak, upper (Wray). Penang, Hill (Wallich 94 *P. scabripes*) (Lady Dalhousie). Lankawi, Gunong Rayah (Curtis 3381). *Distrib.* Whole world.

(4). ***P. ensiformis*** Burm. Fl. Ind. p. 230. Rhizome short, woody covered with rather scanty brown scales. Stipes slender straw-colored, 6 to 10 in. long. Fronds about 6 in. of 5 or more linear or lanceolate linear pinnae, often broad unequally based simple or forked or tri-fid, 4 to 6 in. long, .4 to .18 in. wide; nerves forked or simple. *Hab.* Common in dry open spots lalang fields etc. Singapore gardens; Tanglin; Bukit Timah (Ridley); Pulau Ubin (Murton). Johore, Tanjong Bunga (Ridley 6549). Malacca, Bukit Panchur (Cantley); Selandor; Sungei Hudang (Derry). Negri Sembilan, Seremban (Ridley 9877). Penang (Bishop Hose). Kedah (Kunstler 1744). Tringganu, Bundi (Rostados). Kelantan, Kwala Krai (Haniff).

var. ***montana.*** A very stunted tufted plant growing between stones in streams. Malacca, Mount Ophir (Ridley 3340). Kedah Peak at 3000 feet (Ridley 5165). *Distrib.* India, China Australia, Polynesia. *Native name*: Paku Padang.

(5). ***P. semipinnata*** Linn. Sp. Pl. 1534. Tufted fern with thick short, rhizome. Stipes purplish angled above, 2 to 3 in. long. Frond 9 in. to 3 feet tall; upper pinnae linear acuminate, base decurrent on rachis, lower ones 6 in. long linear, .4 in. wide with 2 to 5 lobes, 2 in. or less from the lower edge and often a small one at the base on the upper edge. Sori in a continuous line along the edges. *Hab.* Shady places. Malacca, Alor Gajah (Hervey, Maingay). Pahang near Pekan (Ridley). Sungei Ujong (Hullett). Selangor, Ginting Bidai (Ridley 7838). Perak, Ulu Bubong (Kunstler 10650). Kelantan, Kwala Krai (Haniff). *Distrib.* Malay isles, China, Japan. *Native name*: Paku Medang, Paku Pelandok.

var. ***inaequalis*** *P. inaequalis* Bak. Journ. Bot. 1875, 199. A tall fern, stipes stout, 18 in. or more. Frond 18 in. to 3 feet long or more, 12 in. wide pinnate; pinnae 9 in. long with broad oblong lanceolate sub-acute lobes, in younger or lower fronds with the longest lobes on the lower side, 1.5 in. long, .5 in. wide, shorter lobes on the upper side and a long 3 in. terminal pinna. In big fronds the lobes nearly equally long, 1.75 in. long and 1.15 in. long respectively. *Hab.* Perak, Maxwell's Hill 2500 feet (Matthew). *Distrib.* China, Japan.

(6). ***P. Dalhousiae*** Hook. Syn. Fil. p. 157. Large fern forming big tufts. Stipes stout dark brown angled 18 in. tall. Fronds 2 to 3 feet long, 12 to 18 in. wide; pinnae long with 5 or more linear lobes on the lower edge, 3 in. long, 2.5 in. wide, the lowest one often again lobed all decurrent on a broad winged midrib, costa prominent. Sori in a continuous line along the edge. *Hab.* Very local, Hill Woods. Malacca Hulu Belangkas (Derry); Bukit Besar; Mount Ophir (Ridley 9867). Selangor, Langat (Ridley 1681). Penang, Penara Bukit (Curtis); Mount Erskine (Lady Dalhousie). *Distrib.* Java, Sumatra.

(7). ***P. Grevilleana*** Wall. Cat. 2680. Tufted plant with stout brown stipes up to 18 in. tall, bluntly 4-angled. Frond 6 in. long 3 to 4 in. wide deltoid, bi-pinnate; pinnae broad over 1 in. wide the terminal one the longest, bluntly acuminate deeply lobed nearly to the rachis or about half way, lobes oblong blunt. Sori along the edges of the lobes broad linear to near the tip. *Hab.* Not common. Pahang, Pekan (Ridley 2163). Perak, Tambun near Ipoh (Ridley); Gunong Mesah, Kinta (Kunstler 7092). Kelantan, Kwala Krai (Haniff). *Distrib.* Sylhet to Chittagong.

(8). ***P. longipinnula*** Wall. Cat. 708. Tufted fern 3 feet tall. Stipes stout, angled above. Frond 18 in. wide, pinnate, pinnae 6 in. long with about 40 oblong linear blunt lobes cut to near base and decurrent on midrib, 1.7 in. long, .3 in. wide coriaceous; nerves once forked from base. Sori in a broad linear line to the top of the lobes. *Hab.* Hill woods. Perak, Sira Rimau base of Gunong Inas (Yapp 606). Penang Hill (Wallich 708). Kelantan, Sungei Keteh (Nur). *Distrib.* Himalayan and S. India mountains, Malay isles.

(9). ***P. quadriaurita*** Retz. Obs. vi. 38. A big fern. Stipes stout, angled brown, 2 feet tall. Fronds over 12 in., with 6 to 12 pairs of oblong pinnae, 6 in. long, lowest pair usually bipartite, all cut down to the rachis or nearly so into narrow linear lobes about 60 on each. Sori continuous to near the tip in a line on the edge of each lobe. *Hab.* Common and very variable in shady woods and forest edges. Singapore, Serangoon road (Ridley). Johore, Batu Pahat, Patani (Ridley). Malacca, Pulau Undan (Cantley); Bukit Panchur. Selangor, Batu Caves (Ridley 8153); Petaling. Perak, Tambun, Ipoh, (Ridley 9543); Goping (Kunstler 524). Penang, Penara Bukit (Ridley 6946. Curtis 1001). *Distrib.* All the tropics.

The Penang Hill form is the var. *Blumeana* with very narrow lobes.

var. ***depauperata;*** pinnae 4 to 6 pairs, lower ones gradually diminishing in size, lowest simply pinnate without auricles so that the frond is obovate in outline, tip of pinnae sometimes long caudate. Perak (Kunstler 1405) fide Beddome, I have not seen this.

var. ***asperula*** J. Smith. Stipes and main rachis generally red armed with short scattered spines. Perak, Gunong Pondok (Matthew).

(10). ***P. patens*** Hook. Syn. Fil. ii. 177. *P. decussata* Sm. Journ. Bot. 3, 405. Big fern tufted. Fronds 6 to 8 feet (Kunstler) pinnate, lower pinnae bi- to tri-partite; pinnae 8 to 16 in. long horizontally patent numerous deeply cut to rachis into very numerous linear decurrent lobes, .15 in. long, .15 in. wide narrowed to a short subacute tip; nerves all free forked from base and again near tip. Sori in a continuous narrow line to near the tip. *Hab.* Malacca (Hervey). Pahang, Fraser Hill (Holttum). Selangor, Batu caves (Ridley 8640) and Semangkok Pass. Perak, Temengoh (Ridley 14232); Larut (Kunstler 2239); Goping (Kunstler 942); Kampar Marshes (Murton). Kelantan, Kwala Badong (Haniff). *Distrib.* India, Malaya, Polynesia.

(11). ***P. aquilina*** Linn. Sp. Pl. 1533. Rhizome stout creeping subterranean. Stipes 1 to 4 feet long, strong smooth. Fronds 2 to 6 feet long, 1 to 2 feet broad, deltoid sub-coriaceous, uppermost pinnae simple, next below lanceolate cut into oblong blunt lobes, lowest long stalked with wide lanceolate pinnules cut to rachis in numerous lanceolate lobes; veins close conspicuous often twice forked. *Hab.* Whole peninsula in sandy lowland country. It occurs up to about 1000 feet alt., and occasionally higher. It appeared under the remains of the huts on Gunong Tahan at 7100 feet about 6 years after the huts were built, but is otherwise quite absent from our high mountain regions.

Our variety is the var. *lanuginosum* in which the lobes are very woolly beneath. A form occurring in Selangor, on Bukit Kutu 3000 feet alt., is woolly on both sides as is the rachis. The same form was collected in Malacca by Maingay. We also have the variety *esculenta* distinguished by the pinnules being more distant longer and narrower, in Singapore (Wallich 102) and Penang (Wallich), Malacca (Griffith); and Mr. Hardy found in Malacca a variety with very long pinnules much resembling the *P. lorigera* of Wallich. *Distrib.* The bracken grows over the whole world except the arctic regions and Temperate S. America. It is absent from our forest region but appears if the soil be sandy very soon after clearance of the jungle. It has lately been separated from *Pteris* under the name of *Pteridium*.

(12). ***P. biaurita*** Linn. Sp. Pl. 2, 1076. *Campteria biaurita* Bedd. Ferns S. I. t. xliv. Closely resembles *P. quadriaurita* in shape and details but rather a larger, coarser fern, with the characteristic nerve arches very conspicuous. *Hab.* Singapore, Serangoon Road (Ridley). Negri Sembilan, Gunong Angsi (Nur). Penang Penara Bukit (Ridley 6946, Norris, Kunstler 1338). Lankawi, Burau Bay (Ridley 15787). Kelantan, Sungei Keteh (Nur).

(13). ***P. Wallichiana*** Ag. Rec. Sp. Gen. Pteris 69. *Campteria Wallichiana* Moore Ind. 221. Stipes 5 to 6 feet, stout, chestnut smooth and glossy. Frond very large sub-membranous tri-pinnate lateral branches compound; pinnae numerous sessile, 4 to 6 in. long linear lanceolate, lobes linear-lanceolate blunt, close set, .5 in. long, basal nerve arched but very inconspicuous, the rest reticulate. Sori in a thick line down each edge. *Hab.* Singapore, Serangoon Road (Ridley 10923). Selangor, Bukit Kutu (Ridley 7836). *Distrib.* Java, Philippines, Polynesia.

(14). ***P. tripartita*** Sw. Schrad. Journ. 1800, 67. *Litobrochia marginata* Bedd. Handb. 122. Erect fern with long stout red stipe. Fronds large tripartite, lateral branches pinnate spreading, long petioled, pinnules 4 to 6 in. long linear oblong acuminate, deeply lobed, lobes linear-oblong falcate blunt, basal nerve forming a single curve parallel with midrib, the rest areolate. Sori in broad band along edges of lobes stopping short of the top. *Hab.* Singapore (Wallich 410, Lobb). Malacca between Jasin and Ayer Bombong (Maingay). Selangor, Batu Caves (Ridley 8146). Dindings, Bruas (Ridley 7268). *Distrib.* Ceylon, Africa, Australia, Polynesia.

## BLECHNEAE

### 28. **Blechnum** Linn.

Tufted ferns with simply pinnate fronds, veins free; fronds sterile and fertile similar. Sori linear parallel to and touching the midrib. Indusium membranous distinct from frond edge. Species over 130. Whole world.

(1). ***B. orientale*** Linn. Sp. Pl. 1535. Stem short, stout, erect with dark brown scales. Stipes 4 to 8 in. long. Fronds 1 to 5 feet long, 6 to 36 in. wide, ovate or oblong; pinnae 9 in. long, .75 in. wide linear long acuminate, bases broad slightly unequal. *Hab.* Very common in open country. Singapore (Wallich); Tanglin; Bukit Timah. Johore, Batu Pahat and Gunong Pulai. Pahang, Fraser Hill (Burkill). Malacca (Griffith); Pulau Besar. Negri Sembilan, Seremban (Ridley 9875). Selangor, Batu Caves (Ridley). Penang, (Wallich etc.). *Distrib.* India, Malaya, China, Australia. *Native name:* Paku Ular, Paku Ikan.

(2). ***B. serrulatum*** Rich. Act. Soc. Nat. Par. i. 114. Stem stout erect. Stipes 6 to 12 in. long. Frond oblong acuminate 1 to 2 feet long, 6 to 9 in. wide; pinnae linear sub-acute, edge serrulate, base broad articulate with rachis very shortly petioled, 3 in. long, .25 in. wide. *Hab.* Damp open country. Singapore, Serangoon Road (Ridley 10917). Malacca (Cuming 385); Ayer Panas (Griffith); Ching (Derry). Pahang, Pekan (Ridley 2160a). Dindings, Pulau Sembilan (Ridley 3056). *Distrib.* Malaya, Australia.

(3). ***B. Finlaysonianum*** Wall. Cat. 2172. Stem short stout. Stipes polished, 12 in. or more. Frond 2 to 6 feet long sub-coriaceous; Pinnae rather distant 6 to 14 in. long, 1 to 1.75 in. wide linear oblong tip abruptly acuminate, base obliquely cuneate entire sessile. *Hab.* Open country. Singapore, Chan Chu Kang (Ridley 6121); Reservoir Woods (4821). Malacca, Mount Ophir (Wight's Herb); Half way to Ayer Panas (Griffith); Sungei Hudang (Derry). Pahang, Tahan river (Ridley). Selangor, Semangkok Pass (Ridley 8656). Penang Hill (Curtis 1002). *Distrib.* Borneo. Papua.

(4). ***B. vestitum*** (Bl.) Kuhn. Ann. Lugd. Bat. iv. 224. Rhizome and stipes very stout, densely covered with broad and large lanceolate acuminate chestnut scales. Stipes 2 feet long. Frond large pinnate, rachis strongly angled; pinnae sterile, 8 in. long 1 in. wide, linear acuminate base broad, very coriaceous Fertile linear, 4 to 6 in. long, .1 in. wide. *Hab.* On high mountains 3000 to 7000 feet on rocks. Pahang, Gunong Tahan (Haniff). Perak, Gunong Batu Putih (Kunstler 8065); Gunong Kerbau 6600 feet (Robinson). *Distrib.* Malay isles.

### 29. **Sadleria** Kaulf.

Stem 3 to 4 feet tall. Fronds large spreading pinnate; nerves forming a series of costal arches. Sori in a continuous line along the midrib about half its length; involucre narrow sub-coriaceous at first wrapped over the sorus then spreading. Species 4, all Hawaiian.

(1). ***S. cyathaeoides*** Kaulf. Enum. Fil. 161. Stem and base of stipe densely covered with soft slender long acuminate chestnut scales. Stipes stout, 6 to 18 in. long, 9 to 18 in. wide, pinnate; pinnae 6 to 8 in. long, .5 to .75 in. wide cut to the rachis into very numerous lanceolate to oblong pinnules, coriaceous; nerves inconspicuous. *Hab.* Perak (Day) fide Beddome. I have not seen this. *Distrib.* Sumatra and Hawaii.

## ASPLENIEAE

### 30. **Neottopteris** Sm.

A large fern with large simple fronds strap-shaped forming a circle sub-sessile. Sori unilateral linear. Indusium, linear straight. Trop. Asia, about 4 species. The generic name *Thamnopteris* is anticipated for a fossil fern.

(1). ***N. nidus*** Sm. Hook gen. t. 113 B. *Thamnopteris Nidus* Presl. Epimel. 68. Fronds linear-lanceolate variable in size, narrowed to base, coriaceous; nerves fine and parallel; petiole up to 6 in. long. *Hab.* Epiphyte in the damp regions.

var. **musaefolium.** Fronds 6 feet long, 9 in. wide. Sori 2.5 in. long.

var. ***phyllitidis*** Fronds narrow more acuminate both ends, 2 feet long, 2.5 to 3 in. wide. Sori 1.5 in. long.

Both varieties are common all over the Peninsula, but *musaefolium* is rare outside.

This species occurs all over the Peninsula but is rare in the drier parts. A crested form and forked forms occur.

### 31. **Asplenium** Linn.

Rhizome creeping or erect. Stipes not articulate. Fronds simple or divided, veins free. Sori linear from the sides of veins. Indusia of the same shape. Whole world. Very numerous.

**Fronds entire**

(1). ***A. squamulatum*** Bl. Enum. 174. Rhizome creeping. Fronds simple lanceolate narrowed to both ends, tip acuminate and often producing bulbils at the tip. Stipes usually 6 to 8 in. long stout. Fronds 2.5 feet long, 3.5 in. wide; nerves numerous parallel with no marginal vein. Sori in parallel lines from the midrib to the edge. *Hab.* Common on rocks and stumps in wet woods. Singapore, Bukit Timah; Chan Chu Kang. Johore, Batu Pahat; Hadji Senawi (Ridley 10964); Tanjong Kupang (a curious branched form). Malacca (Hervey). Perak, Larut 2500 to 4000 feet (Kunstler 6328, 6320); Maxwell's Hill (Ridley). Kelantan Sungei Keteh (Nur). *Distrib.* Malay islands.

Poor specimens of this might be mistaken for *Neottopteris* but it does not possess the stout marginal rib in that species, it is terrestrial with creeping rhizome and it often has bulbils borne on the prolonged midrib, which is never the case in *Neottopteris*.

(2). ***A. Scortechinii*** Bedd. Handbook. Supp. p. 27. Epiphyte with short tufted rhizome. Fronds narrow lanceolate acuminate at both ends decurrent below into a stipe, 3.5 in. long blade 18 in. long, 1 in. wide. Sori very numerous, parallel, .25 in. long from the broad midrib. *Hab.* On trees in mountain forests 2500 to 4000 feet alt. Pahang, Fraser Hill (Burkill and Holttum 8776). Perak, Maxwell's Hill (Ridley 5186) to Gunong Hijau (Curtis 1355, Kunstler, Scortechini); Gunong Inas (Yapp 411).

*A. Mactieri* Bedd. Ferns. Handbook. Supp. p. 27, is a simple form of *A. vulcanicum* Wight.

(3). ***A. amboinense*** Willd Sp. v. 303. Rhizome creeping. Stipes 1 to 6 in. long. Fronds lanceolate sub-acute and often bulbiferous at tip decurrent to base, 6 to 8 in. long, 1.75 in. wide. Sori parallel .3 in. long. *Hab.* Perak, Larut, Thaiping (Scortechini, Kunstler 2141). *Distrib.* Malay islands.

**Fronds simply pinnate**

(4). ***A. normale*** Don. Prod. Fl. Nep. p. 7. Tufted fern. Stipes numerous slender black, 4 in. long. Frond 12 in. long, 1 in. wide, lower edge straight entire; upper edge at base auricled, lowest

ones deflexed. Sori usually few, 4 or 5 short linear generally parallel to nerves. *Hab.* Not common in mountain forests 2800 to 4000 feet, terrestrial. Pahang, Telom (Ridley 13973); Gunong Tahan (Haniff). Perak, Thaiping Hills (Kunstler 2705, Matthew); Gunong Inas (Yapp 402).

(5). ***A. vulcanicum.*** (Bl.) Enum. 176. Terrestrial with short tufted rhizome, and few stipes slender, 7 in. long. Frond of 1 to 7 or 11, pinnae 1 foot long; pinnae sub-opposite in distant pairs, pale green lanceolate acuminate, caudate, base sub-equally cuneate edge entire or serrulate, 4 to 8 in. long, 1.75 to 1 in. wide, petiolules .15 or more. Sori numerous forming a line on each side the midrib more than half way to edge. *Hab.* Usually on rocks Johore, Batu Pahat, Patani (Ridley 11067). Negri Sembilan, Ulu Bendol (Holttum 9882). Perak, Gunong Bubu (Kunstler 8424); Goping (Kunstler 8130, form *Mactieri*); Lenggong (Ridley 14210). Prov. Wellesley (Kunstler 1626). Penang Penara Bukit (Ridley 7074. Mactier etc) Kelantan, Batu Bow, Sungei Keteh (Nur).

Form a. ***Mactieri.*** *A. Mactieri* Bedd. Handbook Sup. 27. Frond reduced to a single pinna. This form occurs usually with the fully developed form of *vulcanicum,* and simple fronds are often to be met with on plants with pinnate fronds. It cannot even be classed as a variety. The original type was described from Penang but it is also common in Perak. *Hab.* Perak, Goping (Kunstler). Penang (Mactier, Norris).

(6). ***A. longissimum*** (Bl.) En. Pl. Jav. Fil. 178. Epiphytic on rocks or ground. Rhizome short creeping. Stipes tufted, 3 to 12 in. long, black. Fronds 2 to 4 (or 8) feet long linear or elongate lanceolate, rooting at tip. Pinnae numerous horizontal, 2 to 3 in. long, .4 in. wide lanceolate acuminate, edges shortly toothed; base truncate auricled on upper edge or on both edges. Sori numerous in 2 rows oblique to midrib and two thirds distance to edge. *Hab.* Common in forests. Singapore, Mandai (Ridley 10930); Bukit Timah (10810); Gardens. Malacca (Cuming 373); St. John's Hill (Derry). Pahang, Pekan (Ridley). Dindings, Bruas (Ridley). Perak, Larut Hill (Kunstler 2550). Prov. Wellesley, Bukit Panchur. *Distrib.* Mascarenes to India, Malaya.

(7). ***A. borneense*** Hook. Syn. Fil. 203. Rhizome stout, creeping. Stipes 1 to 2 in. long. Fronds oblong linear, rather stiff, 12 to 15 in. long. 1.5 to 2 in. wide. Pinnae very over-lapping numerous and close, rhomboid, lower edge entire curved; upper serrate crenate tip blunt, .5 in. long, .2 in. wide, base cuneate. Sori few in parallel rows. *Hab.* Perak, Larut (Kunstler 1998); Bujong Malacca (Curtis 3312, Ridley 9553). *Distrib.* Borneo.

(8). ***A. tenerum*** Forst. Prod. p. 80. Epiphyte and rock plant. Rhizome short. Stipes several, smooth, 4 to 5 in. long. Frond 6 to 18 in. long, 2.5 in. wide. Pinnae oblong blunt sub-equal, edges shortly serrate both sides, base truncate with a short auricle on upper side, terminal part of frond 1 to 2.5 in. long, narrow lanceolate acuminate serrate, with sori in two lines; lower pinnae with linear sori at an angle with midrib nearly to edge; pinnae 1.5 to 2.5 in. long, .5 in. wide. *Hab.* Common in forests. Singapore, Bukit Timah; Ang Mo Kio. Johore, Batu Pahat; Ulu Kahang (Holttum). Pahang, Pulau Tawar. Selangor, Semangkok Pass (Ridley); Gunong Hitam (Goodenough); Bukit Kutu (Ridley 7847); Gunong Menkuang Lebah (Robinson). Perak, Gunong Pondok (Murton); Sira Rimau (Yapp 532). Penang (Mactier). *Distrib.* Ceylon, Malay isles, Polynesia. The pinnae are deeply serrate in the Gunong Mengkuang Lebah form, but nearly entire in some forms.

(9). ***A. lunulatum*** Sw. Syn. Fil. 80. Tufted fern with short thick rhizome. Stipes slender angled, above purple 6 to 7 in. long. Frond 9 in. long, 1 in. wide linear oblong. Pinnae lanceolate oblong blunt very numerous crowded, lower edge often curved blunt; base broad narrowed at extreme base with rounded auricle on upper edge both edges coarse serrate, 1 in. long, .2 in. wide. Sori rather broad not touching midrib or edge. *Hab.* Not common. Pahang, Gunong Tahan (Ridley 16213). Perak, Maxwell's Hill (Ridley); Gunong Batu Putih (Kunstler 8043). *Distrib.* Tropics both worlds.

(10). ***A. caudatum*** Forst. Prod. p. 80. Rhizome tufted. Stipes purple, 8 in. long. Frond 12 in. long 6 in. wide with upwards of 40 pinnae alternate. Pinnae lanceolate long acuminate, often caudate base rhomboid cuneate edge conspicuously serrate, especially upper ones sub-auricled above at base, 4 in. long by .4 in. wide; petiolule .1 in. Sori hardly reaching to edge with short ones intercalated. Occasionally the pinnae have strong lobes on each side, often 2-toothed. *Hab.* Perak, Gunong Inas (Yapp 563); Larut 3500 to 4000 feet (Kunstler 2351); Caulfield's Hill (Scortechini 390). Kedah, Gunong Bintang (Kloss). Perlis, Bukit Lagi (Ridley 14752). *Distrib.* Tropics generally.

(11). ***A. pellucidum*** Lam. Encyc. 305. *A. hirtum* Kaulf. En. Fil. 169. Rhizome stout woody. Stipes stout 2 in. long, hairy. Frond 2 feet long, 4 in. across to 4.5 in., lanceolate, the lowest pinnae very short and round, upper ones lengthening to 2.5 in. long, sub-coriaceous lanceolate acuminate serrate on both edges, base cuneate with a large auricle on upper edge. Sori over 20 at an acute angle with midrib. *Hab.* Johore, foot of Gunong Pulai (Matthew); Pahang, Tahan river (Ridley). Negri Sembilan, Bukit Tangga (Nur). Perak, Larut (Kunstler 2713);

Maxwell's Hill (Matthew). Penang (Lady Dalhousie); Government Hill. Kelantan, Sungei Keteh (Nur). *Distrib.* India, China, Malay isles, Polynesia.

var. ***subavenium*** Hook. Sp. Fil. iii. 143. Stipes very hairy as is rachis with black hairs, fronds 12 in. long, 1.5 in. wide of the shape of the type but pinnae short, broad and blunt, almost entire, a few serrations at tip. Sori few and rather broader, and much shorter. *Hab.* Penang (Mactier). Perak, Maxwell's Hill (Matthew).

I have little doubt that this in an odd form of *A. pellucidum.*

(12). ***A. dimidiatum*** Sw. Prod. 129. Stipes tufted, 4 to 9 in. long, black. Fronds 6 in. (to 2 ft.), 3-8 in. wide; pinnae shortly petioled lanceolate long acuminate, base cuneate rhomboid, edges serrate, coriaceous, the 2 sides unequal; nerves very oblique, conspicuous, 1.5 in. long, .5 in. wide or bigger, 11-20 pairs. Sori in long irregular lines nearly to margin. *Hab.* Not common in forests. Singapore, Bukit Timah (Hullett). Perak, Hot Springs near Ipoh (Curtis 3372). *Distrib.* South Africa, Mascarenes, India and Polynesia.

Beddome suggests that this is a variety of *A. falcatum,* which it probably is, but I have not seen typical *A. falcatum* here.

(13). ***A. macrophyllum*** Sw. Syn. Fil. p. 77 and 261. Resembles *A. falcatum* but has much bigger pinnae. Stipes slender, 6 to 12 in. long in big plants, stout. Frond typical, over 12 inches with 15 to 17 pinnae, in alternate pairs, lanceolate acuminate, base cuneate, edge serrate, 6 in. long, 1.75 in. wide; petiolule .15 in. long. Sori in very numerous linear rows. *Hab.* Rocks and Trees. Singapore, Pulau Ubin (Kunstler); Sungei Buluh; Bukit Timah. Malacca (Griffith, Cuming 375). Selangor, Batu Caves. Negri Sembilan, Perhentian Tinggi. Perak (Scortechini) Province Wellesley, Bukit Panchur. Penang, Bukit Erskine (Curtis); Balik Pulau (Ridley) (Wallich. *A. urophyllum* coll. Porter, no. 1927). Kelantan, Sungei Keteh (Nur).

var. ***latius*** Dwarf plant 8 in. tall, fertile fronds tripinnate; pinnae ovate-lanceolate, 3 in. long, 1.5 in. wide; sterile fronds simple ovate, 3.5 by 1.75. *Hab.* Perak, Kinta River (Kunstler 411) Penang (Kunstler 1467).

This has larger pinnae than *A. falcatum* but is I think nearer that than *A. macrophyllum.*

(14). ***A. paradoxum*** Bl. Fil. Jav. 179. *A. zamioides* Hook. Sp. Fil. iii. 114. Rhizome woody creeping, stout. Stipes not tufted, often scaly, 4.5 to 8 in. long, stout. Fronds 12 in. long, with 7 to 19 pinnae terminal oblong-rhomboid large, laterals oblong rhomboid subacute to acuminate, base cuneate 3.25 to 4 in. long, 1 to 2 in. wide, edges entire or very nearly so, somewhat fleshy. Sori few and nearly reaching to midrib, chiefly on

the upper three or four pinnules. *Hab.* Perak, Bujong Malacca (Curtis 3373). (Kunstler 7164). Penang (Lorrain, Mactier). Lankawi, Gunong Raya (Haniff 15485). *Distrib.* Malay islands.

(15). ***A. perakense*** Matthew and Christ, Journ. Linn. Soc. xxxix. 214. Epiphytic; rhizome thick covered with roots. Stipes 8 in. long, black shining; rachis above pale green. Frond 12 in. long, 3 in. wide; pinnae coriaceous (firmly chartaceous) numerous 20 ( to 30) on each side, 1.5 in. long, simply pinnatifid; auricle (basal upper lobe) large, touching the rachis, lobes cuneate, blunt, tip erose; nerves and sori flabellate. Sori numerous. *Hab.* Mountains. Pahang, Fraser Hill (Holttum). Perak, Thaiping Hills, Gunong Hijau (Matthew).

(16). ***A. monanthes*** Linn. Mant. 130. Rhizome short, stout, creeping. Stipes black purple 6 to 7 in. long. Frond narrow-linear, 6 to 9 in. long, 1.1 in. wide; pinnae about 40 very close set, sessile oblong, lower edge straight, tip rounded. Upper edge lobed shortly, lobes rounded, .3 in. long, .12 in. wide. Sori elliptic-linear one or two on a pinna generally near the lower edge, up to 4 on the lower edge and tip. Indusium rather broad. *Hab.* Woods on high mountains. Pahang, Woods of Teku, Gunong Tahan at 5500 ft. (Ridley 15990). *Distrib.* Madeira, Azores, Africa, South America and Polynesia.

I am quite unable to separate this from typical *monanthes* in spite of its extraordinary distribution.

(17). ***A. heterocarpum*** Wall. Cat. 218. Rhizome creeping. Stipes rather distant, slender, dark brown or purple, 6 to 8 in. long. Fronds 12 to 24 in. long; pinnae membranous about 40, oblong, lower edge entire straight, upper edge and tip many lobed segments bilobed. Sori short, broad on the lobes. *Hab.* Sungei Ujong (Hullet). *Distrib.* India, China, Malaya.

(18). ***A. unilaterale*** Lam. Encyc. ii. 305. *A. resectum* Hook. Syn. Fi. 210. Rhizome creeping subterranean. Stipes rather distant, sender or moderately stout, 6 to 9 in. long, black. Frond 6 to 8 in long, 2 to 3 in. wide; pinnae oblong subsessile horizontal .5 to 175 in. long, .2 to .4 in. wide, lower edge straight or slightly curved, upper edge bluntly toothed to tip and halfway along lower edge, base straight truncate parallel to rachis; nerves simple or forked. Sori oblong, few to ten towards the tip on both sides short. *Hab.* Common in Forests. Pahang, Tahan river; Fraser Hill (Holtum). Malacca, Jeram Nyalas (Derry). Negri Sembilan, Gunong Angsi (Nur). Selangor, Batu Caves (var. *udum* Ridley 8286); Semangkok Pass; Ginting Bidai (7846 var *udum*). Perak, Gunong Batu Putih (Wray 1016), Temengoh (Ridley 14228). Thaiping Hills, Cottage (Hervey). Kelantan, Kampong Parit (Haniff). *Distrib.* Africa, India, Malaya, Japan, Polynesia.

(19). ***A. belangeri*** Kze. Bot. Zeit. 1848, 176. Rhizome short stout, erect Stipes crowded 4 to 6 in. long, flattened up-

wards. Fronds 12 in. long, 3.5 to 4 in. wide often bulbiferous at tip; pinnate. Pinnae 1.75 in. long cut to the winged rachis into about 20 linear lobes .2 in. long and .05 in. wide, lowest pair forked. Sori solitary on the lobes. *Hab.* Hill districts in forest. Perak, Gunong Inas (Yapp 412); Thaiping Hills (Kunstler, Wray). Penang Hill (Fox, Norris). *Distrib.* Java, Sumatra, Borneo.

**Fronds 2 to 3-pinnate.**

(20). ***A. cuneatum*** Lam. Encyc. ii. 309. Stipes tufted 6 to 9 in. long, dark brown or black. Fronds 12 to 18 in. long, 4.5 in. wide, lanceolate; pinnae lanceolate about 40 acuminate stalked; pinnules obcuneate rounded at tip, lowest one lobed, upper ones simple, all bluntly toothed, .25 in. to .4 in. long, .2 to .25 in. wide. Sori 3 to 5 radiating from base. Indusium rather broad. *Hab.* Local in mountain forest. Perak, Bujong Malacca (Ridley 9546) at 3000 ft. alt; Thaiping Hills (Bishop Hose). *Distrib.* Tropics generally.

var. ***affine.*** *A. affinis* Sw. in Schrad. Journ. 1800, 56.

Similar to *A. cuneatum* but the pinnules distant 1.25 in. long and cut into cuneate lobes to the rachis, the lobes .4 in. long, .12 in. wide. *Hab.* Larut, 2800 to 3500 ft. alt. (Kunstler). *Distrib.* Mascarenes, Ceylon, Borneo, Polynesia.

I doubt if this is anything but a finely cut form of *A. cuneatum.*

(21). ***A. bulbiferum*** Forst. Fl. Ins. Austr. Prod. 80. Stipes tufted 6 to 12 in. long, scaly near the base and sometimes hairy. Fronds 1 to 4 ft. long, oblong to ovate lanceolate, 2 to 3 pinnate; pinnae many, often bulbiferous, the largest 8 in. long, 2 in. wide, cut into many lanceolate pinnules of numerous oblong lobes. Sori about 6, ellipsoid, rather large. *Hab.* Penang, (Hance). *Distrib.* India, Africa, Australia, New Zealand, South America.

A common garden plant probably cultivated only in Penang. No one else has seen it wild in our area.

(22). ***A. nitidum*** Sw. Syn. 84. 280. A large tufted fern epiphytic. Stipes 12 in. long. Fronds 2 to 3 feet long, 12 in. or more wide bipinnate, primary pinnae 6 to 9 in. long, lanceolate 2 to 3 in. wide cut to rachis into numerous secondary pinnae with numerous flabellate cuneate or lanceolate pinnuls toothed on both edges. Sori numerous. *Hab.* Not rare, on rocks and trees. Singapore, Bukit Timah (Wallich 214, *A. pulchellum*). Johore, Gunong Pulai (Hullett); Pulau Tiuman; Halji Senawi, Batu Pahat (Ridley 10965). Pahang, Tahan river; Fraser Hill (Burkill). Malacca (Cuming 376, Griffith). Selangor, Batu Caves (Ridley 8144). Perak, Goping (Kunstler 132 and 8180 var. *obtusatum*). Penang (Curtis). Kelantan, Sungei Keteh (Nur). *Distrib.* Indo-Malaya.

This very handsome fern is very variable in the form of pinnules and the amount of cutting.

*A. spathulatum* Bak. Ann. Bot. 8, p. 124. Malacca, according to van Rosenberg. I have seen no specimen, a Sumatran species.

## 32. **Diplazium** Sw.

Ferns resembling *Asplenium* but the sori are often double, each with a linear indusium, one opening interiorly the other exteriorly. All tropics, numerous.

### Fronds simple.

(1). ***D. subserratum*** Bl. Enum. p. 174. Rhizome long, creeping. Stipes slender 4 in. to 9 in. long. Frond membranous 12 to 18 in. long 1 to 1.5 in. wide narrowed gradually at base, tip subcaudate, edges sinuate crenate; nerves fascicled forked, 1 to 3 of the outer ones bearing linear sori, frequently with double indusia. *Hab.* Mountain districts. Pahang, Telom (Ridley 13974); Fraser Hll (Burkill). Selangor, Ginting Bidai. Perak, Thaiping Hills 2 to 3500 ft. alt. (Kunstler); Bujong Malacca (Kunstler 7121); Temengoh (Ridley 14225) Penang, Moniot's Road (Curtis 574, Mactier.) *Distrib.* Java.

### Fronds pinnate.

(2). ***D. chorophyllum*** Bak. Journ. Bot. 1885, p. 104. Stipes tufted pubescent, 6 in. long. Fronds oblong-lanceolate simply pinnate 12in. long, 3 in. wide or more, green on both sides, rachis pubescent, lower pair abruptly deflexed. Pinnae about 20 on a side closeset lanceolate sessile acute, crenulate, base auricled 1.5 to 2.5 in long .5 in. or less wide; nerves deeply forked. Sori little short of midrib and margin. *Hab.* Penang, Penara Bukit (Curtis 127). *Distrib.* Formosa and China.

Probably a variety of *D. tomentosum.*

(3). ***D. pallidum*** Bl. Enum. Fil. Java. 175. Rhizome subterranean black. Stipes distant 12 in. long, rather stout, scaly hairy at base. Fonds 1.5 feet long, 12 in. wide simply pinnate pale green when dry; pinnae lanceolate acuminate minutely serrate spinulose, base slightly oblique 4.5 to 6 in. long, .5 in. wide; nerves conspicuous forked from base. Sori numerous borne on the lower simple branch. Indusium not double or only rarely so. *Hab.* Singapre, Toas. Pahang, Tahan River (Ridley 2167), Sungei Ujong (Hulett). Perak, Ulu Temengoh (Ridley 14209); Maxwell's Hill (Idley). Penang, Penara Bukit (Curtis 1268). *Distrib.* Burma ad Malay isles.

(4). ***D. bammense*** Bl. Enum. Fil. 191. Rhizome creeping. Stipes stout 12 in. long. Frond simply pinnate 9 to 12 in. long. Pinnae oval-lanceolate acuminate, base round entire except the serrate tip, 3 to 5 on each side with a terminal one 5 to 9

in. long, 2.5 in. wide, shortly up to .25 in. petioled, stiff coriaceous; nerves pinnate. Sori slender irregular very numerous, from near or at the midrib to near the edge with interspersed shorter ones. *Hab.* Common in forests. Singapore (Hullett, Lobb). Johore, Gunong Pantai (Kunstler, 235). Pahang, Fraser Hill (Holttum). Malacca, Ayer Keroh and Ayer Panas (Ridley 10786). Selangor, Ginting Peras (Ridley 7031, 783); Menuang Gasing (Kloss). Perak, Larut Hills; Batang Padang; Thaiping (Kunstler); Waterloo (Curtis 1361). Penang (Mactier, Wallich 194). Kelantan, Sungei Keteh (Nur). *Distrib.* India, China, Malaya, Polynesia.

The pinnae are rather broader in the common lowland form than in the Indian one.

var. ***Lobbianum*** Racib. Pinnae narrow lanceolate 8 in. long, 1 in. wide, strongly serrate, petiole .25 in. long. *Hab.* Mountains at 3000 to 4000 feet. Selangor, Bulit Kutu (Ridley 7844). Perak, Gunong Kerbau (Robinson). *Distrib.* Java, Philippines.

(5). ***D. xiphophyllum*** Bak. Chr. Ind. 241. Stipes stout with numerous linear acuminate scales at base over 2 feet tall. Frond 2.5 feet long simply pinnate; pinnae lanceolate long acuminate sinuate and dentate along edge, base broad or very shortly narrowed midrib stout, 9 in. long, 1.25 in. wide, veins forked from base. Sori broad linear from midrib to edge with short intermediate ones from edge inwards. Indusium narrow linear double. *Hab.* Perak, 3000 feet. Thaiping Hills (Bishop Hose). *Distrib.* Borneo.

(6). ***D. larutense*** Bedd. Handbook Supp. t. 38. Rhizome erect. Stipes crowded 12 in. long. Fronds linear anceolate, 12 in. long, 1.5 to 2 in. wide broadest at base narrowing to a lobed and serrate acuminate point, simply pinnate; pinnae oblong base broad truncate and auricled on upper edge, tip quite round, slightly crenate, sub-coriaceous, .75 in. long, .4 in. wide; veins simple or lowest ones forked. Sori lowest one usually double, the others with simple indusium reaching from the midrib to edge. *Hab.* Perak, Larut (Hills) 1800 feet alt. (Kunstler 193).

(7). ***D. crenato-serratum*** (Bl) Moore Ind. 121, 325. *D. porrectum* Wall. Cat. 204. Stem erect rather woody. Stipes rather slender 6 to 7 in. long. Fronds 8 to 10in. long, simply pinnate deltoid oblong; pinnae 1.5 to 3 in. long, ½ to .75 in. wide lanceolate, base broad auricled above, serrate, nerve patent, pinnate in auricles others forked. Sori on the basal neve branch from midrib to edge. Indusium double mostly. *Hb.* Common in woods in rather dry spots. Singapore, Chan Ch Kang (Ridley 4399); Garden Jungle; Holland Road (5700). Johore, Batu Pahat (Ridley 10978); Gunong Pulai (3751). Malacca, Batu Tiga (Derry 985); Ayer Panas (16); Nyalas (Hervey) Pahang, Tahan

river (Ridley). Negri Sembilan, Gunong Angsi (Ridley 868); Ulu Bendol (Holttum). Selangor, Semangkok Pass (Ridley 8648). Perak, Larut (Kunstler 2255); Ulu Kal (10503) and Batang Padang; Gunong Kerbau 5000 feet (Robinson); Gapis Pass (Curtis 1360). Penang West Hill (Curtis 1000). Kedah Peak (Ridely). *Distrib.* Malay isles. *Native name*: Paku Naga.

(8). ***D. japonicum*** Thunb. Fl. Jap. 334. Rhizome creeping or sub-erect. Stipes up to 18 in. long, pubescent or glabrous. Fronds herbaceous 8 to 18 in. long, 6 to 8 in. wide, deltoid to lanceolate, rachis and costa more or less woolly. Pinnae 6 to 12 on each side cut half way to a rachis or quite down to it; lobes nearly entire, tip toothed, round or falcate; nerves pinnate, sori from near midrib to near margin. *Hab.* Perak, Maxwell's Hill 3000 feet (Matthew) not seen.

(9). ***D. sorzogonense*** Presl. Tent 114. Stipes rather stout 12 in. or more, scaly at base often on rachis. Frond up to 16 in. long simply pinnate; pinnae numerous sessile or sub-sessile oblong lanceolate, 6 to 8 in. long, 1 to 1.25 in. wide cut down into oblong parallel sided blunt lobes, nearly to base, toothed at the tip .16 to .20 in. wide. Sori short radiating from the central conspicuous nervule of the lobe. *Hab.* Singapore, Selitar (Ridley 6557); Bukit Timah (Kunstler 334). Pahang, Tahan River. Malacca (Maingay). Selangor, Kwang (Ridley 3432). Perak, Kinta (Kunstler 7151); Gunong Hijau (Matthew). Penang (Lady Dalhousie, Hullett) (Wallich *Asplenium parallelum*).

Var. ***major*** Bedd. Handbook Supp. 40. Stipes 2.5 feet long. Fronds 4 to 6 feet. Pinnae coriaceous 1 foot long, 2 to 2.5 in. wide or less, lobes cut down nearly to base, oblong linear, toothed the whole length. *Hab.* Mountains. Pahang, Gunong Tahan (Ridley 15991). Perak, Gunong Bubu (Kunstler 7403).

(10). ***D. prescottianum*** Wall. Cat. 235, resembles *D. sylvaticum* but the frond is smaller, the pinnae narrow lanceolate acuminate hardly lobed except at the base, where there are 2 or 3 distinct rounded lobes; petioles rather long. *Hab.* Singapore (Wallich 235); Kranji (Murton). Penang (Norris).

(11). ***D. tomentosum*** Hook. Syn. Fil. p. 234. Tufted fern with short stout stem. Stipes 4 to 5 in. long, dark brown slender. Fronds deltoid lanceolate 6 to 9 in. long. Pinnae 1.5 to 2.5 in. long, lower pair deflexed, .25 to .3 in. wide, narrow oblong often falcate, base truncate auricled above, edge crenulate serrate to shortly lobed often half way to rachis, sub-coriaceous, main rachis pubescent and nervules beneath hairy, pinnate 3 to 4 on each side. Sori long. *Hab.* Common in lowland forest. Singapore, Bukit Timah. Malacca (Griffith, Maingay). Negri Sembilan, Bukit Sulu (Cantley); Gunong Tampin (Holttum). Selangor, Labu river; Petaling; Menuang Gasing (Kloss). Perak, Thaiping Hills (Hervey); Ulu Bubong (Kunstler); Ulu Temengoh (Ridley



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14224); Gunong Inas 4000 feet alt (Yapp); Goping (Kunstler 658). Penang, Penara Bukit (Curtis 1267). *Distrib.* Burmah, Malay isles.

*D. tomentosum* varies a little in the cutting of the pinnae. I found a form on the Thaiping hills, Perak with the lobes cut narrow linear-oblong to the midrib in the lower pinnae (No. 11428).

(12). ***D. speciosum*** Bl. Enum. 193. Stem erect projecting above ground level. Stipes tufted 12 in. long from a stout woody rhizome with numerous scales at the base. Frond 1 to 2 feet long simply pinnate; pinnae 9 in. long, .75 in. wide, lanceolate with a long serrate point, lobes oblong rounded, cut about half way down, .25 in. wide. Sori rather short radiating on the pinnate nerves. *Hab.* Common in woods. Singapore, Reservoir Woods (Ridley 12562); Tanglin (Murton); Serangoon Road (Ridley 8937). Johore, Gunong Pulai (Ridley 12130); Gunong Lambak (Holttum 9386). Pahang, Fraser Hill (Burkill). Malacca (Maingay, Cuming 390); Mount Ophir (Wight's Herb.); Ayer Panas (Derry). Selangor, Batu Caves. Dindings, Gunong Tungul (Ridley 7271). Penang (Wallich *A. acuminatum*). Kedah Peak (Ridley 5166). *Distrib.* India, *Native name*: Paku Kijang.

Referred by Clarke to *D. sylvaticum* as a form and perhaps it is. This set of *Diplazium* is very difficult to break up.

(13). ***D. latifolium*** Don. Prod. Fl. Nep. 8. Stem erect stout; petiole long. Frond bipinnate, 6 to 8 feet long, 3 to 4 feet wide. Pinnae (secondary) lanceolate acuminate 3.5 in. long, 1 in. wide cut down about half way into oblong blunt lobes, more or less crenate or serrate. Sori narrow. *Hab.* Mountains. Malacca (Griffith). Selangor, Batu Caves (Matthew); Rawang (Ridley 7843); Semangkok Pass (8652). Perak, Goping (Kunstler 455) and Ulu Kerling (8797); Gunong Bubu (8420); Gunong Kerbau (Robinson); Ulu Temengoh (Ridley 12411). *Distrib.* India, Malaya, Australia.

Young plants have often simply pinnate leaves and then can hardly be separated from *D. sylvaticum*.

(14). ***D. asperum*** Bl. Enum. 195. Stem 4 to 16 in. tall, 3 to 4 in. through. Stipes with dense brown fibrillose scales at top. Stipes 12 in. long. Fronds 3 to 4 feet long, 2 feet wide bipinnate with 8 to 9 primary pinnae; secondary pinnae 2 to 4 in. long oblong cut down nearly to rachis, lobes .25 in. long, .12 in. wide numerous tip serrate; nerves about 6; sori in 2 oblique rows. *Hab.* Hill forest by streams, Pahang, Telom (Ridley 13978); Kwala Tahan (2400); Fraser Hill (Burkill and Holttum 8844). Malacca (Hervey). Negri Sembilan, Gunong Angsi (Nur). Perak, Ulu Temengoh (Ridley 14206); Ulu Bubong (Kunstler 10849) and Goping (534). Penang, Balik Pulau (Curtis). *Distrib.* India, Malaya.

### 33. **Anisogonium** Presl.

Tufted ferns. Leaves entire or pinnate; nerves anastomosing Sori resembling those of *Diplazium*. Species about 10, Tropical Asia.

(1). ***A. cordifolium*** Mett. Fil. Hort. Lips. p. 74, t. 12, f. 6. Fronds entire oblong ovate cordate, coriaceous or pinnate with 5 lobes, the top one much the largest; lobes narrowed at the base tip acuminate, 8 in. long, 4 in. wide, or in pinnate form 6 in. long, 2 in. wide. Stipes about 9 in. long. Nerves close very numerous anastomosing copiously on the edge. Sori long narrow very abundant reaching nearly to the edge. *Hab.* Common in the south. Low country to 4800 ft. (Singapore, Bukit Timah (Ridley 5867). Selangor, Kuala Lumpur. Negri Sembilan, Kupayiang (Cantley). Perak, Thaiping Hills (Hervey, Murton); Gunong Inas 4800 feet (Yapp); Batang Padang District (Kunstler 7869). Penang (Norris, Wallich); Penara Bukit (Curtis). *Distrib.* Malay islands, *Native name*: Paku Tunjok Langit.

(2). ***A. lineolatum*** Mett. Fil. Hort. Lips. 74, t. 11, f. 5. Stipe stout scaly below, 6 to 9 in. long. Frond pinnate (rarely simple) pinnules 10 to 12 coriaceous, ovate lanceolate acuminate sessile, base rounded or very slightly narrowed, terminal one largest, 4 to 6 in. long, 1.25 to 2 in. wide often bulbilliferous at the base of pinnules; nerves in clusters of 4 to 8 numerous. Sori numerous irregular to near the edge. *Hab.* Not rare; in wet mountain woods in north chiefly. Pahang, Fraser Hill (Burkill and Holttum 8799). Perak, Thaiping Hills (Kunstler 2160, 2165, 6274); Gunong Batu Putih (Kunstler 8026); Gunong Inas 4600 feet (Yapp); Ulu Temengoh (Ridley 14229). Penang Hill (Lorraine, Hullett). *Distrib.* Malay islands.

Recorded in books from Malacca but I have never seen it from there.

(3). ***A. decussatum*** Presl. Tent. Pterid. 115. A fine big fern. Stipes stout muricate. Fronds 2 to 4 feet long with numerous pinnae about 12 in. long and 3 in. wide, oblong, lobed with short round lobes; nerves conspicuously pinnate with about 8 pairs of very narrow linear sori. *Hab.* Mountain forests, local. Pahang, Telom (Ridley 13970). Perak, Thaiping Hills at 5000 feet (Curtis 1359) Birch's Hill (Day) and Gunong Hijau.

(4). ***A. heterophlebium*** Mett. Hook. Syn. Fil. p. 243. Stipes grey usually scaly all over. Fronds 12 to 18 in. long, 8 to 9 in. broad; pinnae opposite 6 to 8 pairs, terminal portion pinnatifid lower ones 2 to 4 in. long, edge undulate or shortly lobed, tip acute, base broad sessile on rachis and often decurrent, thin herbaceous; veins pinnate anastomosing towards the lower part. Sori copious short oblong. *Hab.* Pahang, Telom (Ridley 13971). *Distrib.* India, and China.

(5). ***A. esculentum*** Presl. Rel. Haenk. i. p. 45. Tufted plant with short stout stem. Fronds bipinnate rather flaccid, 3 to 4 feet long, lower pinnae 12 to 18 in. long, 6 to 8 in. wide, pinnules oblong acuminate shallowly lobed on edge, base truncate, 3.5 in. long .4 in. wide; nerves fine much pinnate, 6 to 10 on a lobe, with short sori on all the lateral veinlets. *Hab.* Common in damp woods and in open country by water courses. Singapore, very abundant in ditches, Bukit Timah Road. Pahang, Pulau Manis, Pahang river (Ridley). Selangor, Dusun Tua (Ridley 7863). Negri Sembilan, Seremban. Perak (Scortechini). Kelantan, Kwala Limau Nipis (Nur). Setul, Rajah Wang (Ridley 14759). *Distrib.* India, Malaya, China. *Native name*: Paku Anjing; *Use.* Valued as a pot-herb.

### 34. **Hemidictyum** Presl.

Resembles *Asplenium* but the veins anastomose only close to the edge. Species 2 Asiatic.

(1). ***H. Finlaysonianum*** Hook. Syn. Fil. 245. Fern with the habit and appearance of *Asplenium macrophyllum.* Stipes 6 to 9 in. long, frond 12 in. long, 6 to 8 in. wide occasionally simple and entire; pinnae 2 to 6 opposite pairs, 4 to 8 in. long, lanceolate, very acuminate; base long narrowed petioluled, texture leathery; veins flabellate very oblique anastomosing at edge. Sori very oblique, 1.5 to 2 in. long. *Hab.* Penang (Wallich 191 Herb. Hook.) Perak (simple form) (Scortechini). *Distrib.* Bengal, Assam.

## ASPIDIEAE.

### 35. **Phegopteris** Fee.

Ferns with the habit of *Lastraea,* but with no indusium. Fronds simply pinnate to decompound. Sori round usually medial on the veins. Tropics and temperate regions numerous.

Both the 2 species given below may prove to be *Lastreas.* Beddome says of *Kingii* "it may be a Lastrea," but he has not been able to find indusia, and Wright thinks he can see indusia on my specimen from Telom. The presence of an indusium would put them in *Lastrea.*

(1). ***P. Kingi*** Bedd. Handbook Supp. 84. Fronds large tripinnate quadri-pinnatifid. Stipes stout scaly at base pinnae 1.5 ft. long, rather remote; secondary pinnae sub-remote in pairs, 4 to 6 in. long, lanceolate acuminate, cut down to the rachis or nearly so into oblong or obovate oblong broad-based blunt lobes, rather deeply acutely lobulate, about .5 in. long, .25 in. wide, midrib sparsely hairy; veins forked. Sori medial at the fork. *Hab.* Mountains at 1000 to 1500 feet. Perak, Larut (Kunstler). *Distrib.* Java.

(2). ***P. laserpitiifolia*** Scort. in Bedd. Journ. Bot. 25 (1887) 324. Stem short ascending. Stipes tufted, 12 to 16 in. long, slender scaly towards base. Fronds tri-pinnate deltoid-ovate, 12 in. long, 6 in. wide; pinnae lower, 4 to 6 in. long, 2 to 3 in. wide; secondary pinnae 1 to 2 in. long, .75 to 1 in. wide, pinnules ovate oblong round, .3 to .6 in. long, obliquely truncate unequal at base. Veins pinnate in each lobule. Sori terminal fairly large one or two on the lowest veinlet of the lobe. *Hab.* Mountain forests rare. Perak (Scortechini). Pahang, Telom (Ridley); Fraser Hill 4000 to 4370 feet (Burkill and Holttum 8798).

**Excluded Species**

*P. appendiculata* (Wall. Penang No. 349) fide Rosenberg. The Penang plant in Herb. Wall. is a *Nephrodium*.

*P. erubescens* Sm. Hist. Fil. 233. There are two sheets in Herb. Kew written up "Malacca (Griffith)" much resembling some from Mishmee (Griffith). I have seen no more of this plant from the Malay Peninsula and presume that the specimens are wrongly localised.

## 36. **Dictyopteris** Presl.

Ferns with the habit of *Aspidium* but no indusium. Frond broad simply pinnate or palmate; veins copiously anastomosing with or without free veinlets. *Distrib.* Indo-Malaya. Christensen puts them under *Aspidium*.

(1). ***D. Barberi*** *Hook.* Sp. Fil. v. p. 100. Stipes tufted, 6 to 12 in. long, slightly scaly at the base. Fronds palmately lobed or pinnate with a large acuminate terminal segment; pinnae 1 to 4 pairs, oblong-lanceolate 4 to 6 in. long, 1 in. wide, entire to widely crenulate, lowest pair with a long lanceolate lobe from base on lower edge subcoriaceous; areoles large and regular, many free veinlets. Sori abundant, chiefly in 2 rows along the veinlets and on the tips of free veinlets. *Hab.* Common in woods in the south. Singapore, Bukit Timah (Murton). Selangor, Rawang, Penang (Wallich, Seemann).

(2). ***D. difformis*** Moore Ind. 90. *D. irregularis* Presl. Hook. Sp. Fil. v. 101. Big plant with tufted stout stipes on an ascending caudex. Stipes 4 in. to 1.5 foot long with black setaceous scales at the base. Fronds subcoriaceous pinnate. Pinnae numerous 6 to 12 in. long, 1 to 3 in. wide, shortly petiolate, oblong acuminate, lowest pair unequally bilobed. All more or less deeply lobed to within .25 in. from midrib, lobes blunt or acuminate, entire to crenulate serrate at tip. Veins anastomosing copiously forming long areoles with free veins. Sori dorsal on the veinlets, rarely on free ones, copious. *Hab.* Forests, common. Singapore, Bukit Timah (Murton, Norris). Malacca (Hervey, Griffith). Pahang, Tanjong Antan, Pahang river. Negri Sembilan, Seremban

(Cantley). Selangor, Semangkok Pass. Perak (Scortechini). Penang (Maingay). *Distrib.* Burma, Malaya. *Native name.* Paku Siar.

(3) ***D. subdecurrens*** v. A. van Rosenberg, Malayan Ferns. p. 514. Stipes dark red brown, naked. Fronds 20 in. long, 10 in. wide, elliptic pinnate, pinnae 5 pairs, lowest pair stalked deltoid, acuminate obliquely lanceolate forked at base below, terminal pinna large rhomboid, base narrowed, trilobed, lowest lobes large, central lobe trilobed, a large central ovate part and 2 small lateral lobes. Areolae large with rarely a few free veinlets. Sori in 2 to 4 rows between the main veins. *Hab.* Singapore, according to Rosenberg. I have not seen it.

### 37. **Stegnogramme** Bl.

Terrestrial fern; rhizome short, stout. Stipes long. Fronds pinnate, lobes of sterile fronds broader than those of fertile fronds; veins parallel running to margin, veinlets of contiguous groups uniting. Sori linear-oblong. Species 3. Malaya, Polynesia.

Resembles *Goniopteris* except for its linear sori.

(1) ***S. aspidioides*** Hook. Sp. Fil. v. 150. Stipes 18 in. long, stout. Fronds hairy on both sides especially on the veins; rachis hairy; pinnae oblong or ovate lanceolate, subacute, base broad dentate, sterile ones 2 in. long, .75 in. wide, fertile ones 1 in. long .5 in. wide, veins 5 to 6 pairs, 2 to 5 lower ones united with an excurrent spurious vein reaching to the sinus. Sori on all the veinlets linear oblong. *Hab.* Mountain forests. Perak (Scortechini); Kinta (Kunstler) *Distrib.* India and Java.

(2) ***S. Lobbiana*** Hook. Sm. Hist. Fil. 152. Rhizome short, moderately thick. Stipes approximate rather stout, black 4 to 8 in. long. Fronds lanceolate long acuminate at both ends, 5 to 11 in. long, 1 in. wide stiffly coriaceous, veins parallel ascending simple or forked inarching at the tip near the margin. Sori on all the veins nearly to margin. *Hab.* Mountains, Johor, Gunong Pantai (Kunstler). Perak (Kunstler).

### 38. **Meniscium** Schreb.

Terrestrial ferns, with pinnate (or simple) fronds rather thin, membranaceous-coriaceous, veins pinnate, veinlets numerous opposite ones uniting at an angle or in an arc emitting a free or continuous veinlet from the angle. Sori oblong or linear short on the transverse connivent veinlets. Species about 20. Tropics.

This only differs from *Goniopteris* in the shape of the sori, and is put by Christensen under *Dryopteris* (*Nephrodium*).

(1). ***M. triphyllum*** Syn. Fil. 19, 206. Rhizome long creeping, slender with chestnut lanceolate acuminate scales persisting only at tips, rest of rhizome sparsely hairy. Stipes slender, 1 in.

apart, sparsely hairy 6 to 12 in. long, shorter in sterile fronds. Fronds thin, membranous, with 3 or 5 pinnae at the top oblong lanceolate repand, base broad very shortly cuneate, tip long acuminate, terminal one 4 to 6 in. long, .75 to 1.5 in. wide, laterals hardly half as large shortly stalked, fertile ones usually narrower, midrib and often the veins pubescent beneath, veins slender numerous flexuous, veinlets forming an arch. Sori in a curve, very numerous. *Hab.* In muddy ditches and on muddy stream-banks, common, Singapore (Lobb); Macpherson Road (Ridley). Johor, Foot of Gunong Pulai (Matthew). Pahang, Tahan river. Malacca (Maingay). Perak, banks of Kerling river (Kunstler); Sungkai (Kunstler). *Distrib.* Indo-Malaya, China.

(2). ***M. salicifolium*** Wall. Cat. 63. Rhizome stout woody. Stipes approximate, stout, 12 to 18 in. long thickened with black linear acuminate scales at base. Fronds 12 to 18 in. or more long, pinnae numerous, rather distant .75 to 1.5 in. apart, 4 to 8 in. long, .25 to .75 in. wide, narrow lanceolate, long acuminate below long narrowed to the base, edge entire or slightly sinuate, thinly coriaceous, veins oblique .1 in. apart, veinlets forming arches. Sori curved oblong, very numerous about 6 between each pair of veins. *Hab.* On rocks in streams, Singapore, Selitar (Bishop Hose). Selangor, Ulu Gombak (Ridley). Perak, Maxwell's Hill and Remas River (Matthew); Larut Hills (Kunstler); Ulu Bubong (Kunstler). Penang (Wallich, Norris); Ayer Hitam, a dwarf form, 7 in. tall (Curtis) *Distrib.* Borneo.

## 39. **Dipteris** Reinwdt.

Terrestrial ferns often growing in great masses. Rhizome slender long, creeping. Stipes long, distant. Fronds flabellate in two halves deeply lobed, veins numerous with many areoles, with free or netted veinlets. Sori numerous small scattered or in a single row near the midrib. Species 5. Tropical Asia.

(1). ***D. conjugata*** Reinw. Syll. Pl. ii. 3. *D. Horsfieldii* Bedd. F.B.I. t. 321. Hook. Sp. Fil. v. 99. Rhizome long, thick, woody covered with dark red to black subulate scales. Stipes 1.5 in. apart, 3 to 5 feet long, smooth. Frond 1 to 3 feet long and broader, subcoriaceous glaucous beneath, strongly veined, lobes broad lanceolate acuminate, 1.5 in. wide, cut half way down, dichotomously; areoles very numerous. Sori minute scattered very numerous. *Hab.* On sea coast banks and rocks, and on mountains at 2500 ft. to 5000 ft., in great masses. Singapore Harbour; Kranji (Ridley); Pulau Tekong. Johor, Gunong Pantai; Gunong Pulai. Pahang, Tahan river and Gunong Tahan to 3000 ft. alt. Malacca, Mount Ophir (Derry). Selangor, Semangkok Pass. Perak, Maxwell's Hill; Gunong Inas (Yapp). Penang Hill. Kedah Peak. *Distrib.* Malay isles to Polynesia.

(2) ***D. Lobbiana*** Hook. Sp. Fil. v. 100. Rhizome thick, scales as in *conjugata*. Stipes 1 in. apart, 12 to 18 in. tall, smooth. Fronds 7 in. long and wide, deeply cut into narrow linear acuminate lobes, .1 in. wide, 6 in. long, subcoriaceous. Veins conspicuous parallel, with large soriferous areoles near midrib, the other veinlets forming small areoles with free veinlets. Sori one, rarely 2 in areoles next the midrib, forming a row on each side. *Hab.* Mountains 2000 ft. upwards. Johor, Gunong Pantai, Gunong Pulai (Murton); Sungei Berhidong (Holttum). Pahang, Kwala Pahang. Malacca, Mount Ophir (all collectors). Perak, Maxwell's Hill above Waterfall (Matthew); Bujong Malacca. Kedah Peak.

var. ***binerve*** Ridl. Lobes of frond broader, .25 in. wide, with 2 midribs, running nearly to top and only cut halfway. Pahang, rocks in the Teku river, Gunong Tahan at 5500 ft. alt. (Ridley).

I have seen nothing like this anywhere else.

## 40. **Oleandra** Cav.

Rhizome long creeping scaly. Fronds lanceolate entire on short jointed stipes; veinlets numerous parallel, fine. Sori round in a row on each side of the midrib. Indusium reniform. Species 10 all tropical.

(1) ***O. neriiformis*** Cav. Annal. Nat. Hist. i. 115. Hook, Fil. Exot. t. 58. Branches long woody scaly, .15 in. through, erect. Stipes .1 in. long woody. Fronds lanceolate-oblong caudate, base narrowed thinly coriaceous in whorls at the branch ends, 4 to 8 in. long, .5 to 1.5 in. wide; veinlets very numerous. Sori close to midrib. *Hab.* Mountains, terrestrial or epiphytic 3000 feet and upwards. Johor, Gunong Belumut (Holttum). Malacca, Mount Ophir (Griffith and all collectors). Selangor, Bukit Hitam; Hulu Semangkok. Perak, Ulu Batang Padang (Wray); Thaiping Hills, Cottage (Hervey); Gunong Inas (Yapp); Gunong Kerbau (Robinson). Kedah Peak, forming dense thickets (Ridley, Robinson). Penang (Norris). Lankawi (Curtis). *Distrib.* India, and Central America.

(2) ***O. musifolia*** Presl. Epimel 42. Stems long creeping covered with long acuminate brown scales. Stipes 1 to 2 in. long, slender. Fronds single, oblong linear acuminate, base narrowed or rounded, thinner than in *O. neriiformis* 12 to 20 in. long, 1.5 in. wide. Sori in 2 rows along but a short distance from the midrib. *Hab.* Mountains, Pahang, Gunong Tahan (Haniff). Perak (Scortechini). *Distrib.* India, Malaya.

(3) ***O. Cumingii*** Sm. Journ. Bot. 3, 413. Rhizome slender, creeping and branching with brown acuminate scales. Stipes distant, slender 4 in. long. Fronds lanceolate acuminate, base

gradually narrowed, rather firmly membranous pubescent villous on the veinlets and midrib. Sori large close to the midrib. *Hab.* Kedah Peak (Ridley). *Distrib.* Burmah, China, Philippines.

### 41. **Nephrolepis** Schott.

Rhizome generally creeping, slender. Stipes slender. Fronds long narrow simply pinnate; pinnae lanceolate acuminate articulate at base, with often white chalky dots above, veins forked, free clavate. Sori round from the upper branch of a vein, near the edge. Indusium reniform or round. Species 17, tropics of the whole world.

(1) ***N. acutifolia*** Christ, Farnk. der Erde 291, fig. 907, r, s and y. *Lindsaya lanuginosa* Hook. Bak. Syn. Fil. 109. Rhizome creeping stout long, covered with scales. Stipes 2 to 6 in. pendent. Fronds 2 feet or more long pendent, simply pinnate; pinnae oblong blunt to linear, base broad thin coriaceous deciduous, 1 to 1.5 in. long, .25 in. wide. Sori in a line along each edge. *Hab.* On trees chiefly near the sea. Singapore, Jurong; Bajau (Ridley 6553). Perak (Scortechini). Penang (Wallich). *Distrib.* Africa and Islands, Tavoy, Labuan, Australia, Polynesia.

(2) ***N. acuminata*** Kuhn. Ann. Mus. Bot. Lugd. Bat. iv. 286. *N. davallioides* Kze Rac. Fl. Buit i. 292. Hook. Syn. Fil. 302. Rhizome short. Stipes 12 in. long, stout, scurfy. Fronds 2 to 3 feet long; pinnae distant, sterile thinly coriaceous, lanceolate acuminate at base of frond, base cuneate, edge serrate, 6 in. long, .6 in. wide; fertile pinnae narrower, .25 in. wide, terminal, serrate more deeply. Sori one at the end of each tooth, involucre reniform. *Hab.* Mountains at 2000 to 5000 feet alt., Selangor, Bukit Hitam; Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills (Scortechini, Kunstler); Gunong Kerbau (Robinson). *Distrib.* Java.

(3). ***N. hirsutula*** Presl. Tent. 79. Rhizome erect densely clothed with dark appressed scales, stoloniferous. Stipes tufted, glabrescent. Fronds 18 in. long, 3.5 in. wide; pinnae close, not imbricate, .25 in. wide, linear acute crenulate, base broad, rounded below, auricled above, sub-coriaceous densely clothed with woolly red-brown scales. Sori sub-marginal, close. Indusium often orbicular. *Hab.* Open wood. Singapore, Tanglin. Johor, Pulai dua Atas (Burkill). Selangor, Kwala Lumpur. *Distrib.* All tropics.

(4). ***N. cordifolia*** Linn. Sp. Pl. 1549 (*Polypodium*) Presl. Tent. 79. *N. tuberosa* Hook. Sp. Fil. iv. 151. Stem sub-erect, the fibres tuberous. Stipes tufted, wiry, 1 to 4 in. long. Fronds 2 feet long or less, subcoriaceous; pinnae numerous crowded, often imbricate, 1 to 1.5 in. long, .5 to .6 in. wide, blunt, edge slightly crenate or entire, lower side round or cordate, upper auricled at

base, rachis scaly. Sori about half way between the midrib and edge. Indusium persistent, reniform. *Hab.* Pahang, Gunong Tahan (Haniff). Selangor, Batu Caves (Matthew).

(5). ***N. volubilis*** Sm. Journ. Bot. iii. 113. *N. radicans* Kuhn. Ann. Mus. Bot. Lugd. Bat. iv. 285. Rhizome climbing up to 30 feet, with scales on the branches where the slender stipes rise and often on the stipes. Fronds 6 to 7 in. to 12 in. long; pinnae sterile oblong round at tip, base broad, truncate, shortly auricled above, entire or crenulate, .5 in. long, .25 in. wide; fertile pinnae as in *exaltata* but smaller, 1.25 in. long, .2 in. wide, stiff coriaceous. Sori close to margin. *Hab.* Climbing on trees in damp spots, not rare. Singapore, Rochore; Sungei Morai. Johor, Tanjong Kupang. Malacca, Ayer Keroh; Jus (Goodenough); Mount Ophir (Griffith). Perak, Batu Kurau. Dindings, Pulau Sembilan. Tringganu, Bundi (Rostados). Langkawi, Kwah (Curtis). *Distrib.* Burmah, Borneo. *Native names*: Paku Baging; Paku Racha; Paku Nirah, Paku Ningek.

(6). ***N. acuta*** Presl Tent. 79. Hook. Sp. Fil. iv. 153. *N. biserrata* Schott Gen. Fil. t. 3. Rhizome short tufted. Stipes 6 to 8 in. long; pinnae lanceolate acuminate crenulate, base cuneate, hairy when young, glabrous when adult, coriaceous, 8 in. long, 1.2 in. wide. Sori in a line some way from the margin. Indusium reniform to sub-orbicular. *Hab.* Open woods, not rare. Singapore (Schomburgh). Johor, Tanjong Kupang. Pahang, Tahan river. Malacca in wet grass, Pulau Jawa (Griffith). Selangor, Batu Caves. Perak (Wray and Kunstler). Penang, a crested form (Mactier). *Distrib.* Africa, India.

(7). ***N. exaltata*** Schott. Gen. Fil. t. 3. Rhizome sub-erect. Stipes tufted, 4 to 6 in. long. Fronds up to 3 feet long; pinnae close linear lanceolate acuminate or acute, edge crenulate or entire, base truncate, with a short narrow auricle above and a smaller rounded one beneath, 2 to 3 in. long, .25 to .5 in. wide, thinly coriaceous. Sori along the edges. Indusium persistent, reniform. *Hab.* Very common in all our open country, from Singapore to Penang.

A curious crested form was also met with in Kwala Lumpur. *Distrib.* Nearly the whole world. *Native name*: Paku Pinang.

(8). ***N. ramosa*** Moore Ind. 102. Rhizome slender long creeping. Stipes short scattered articulate. Fronds up to 12 in. long, 1 to 3 in. wide; pinnae .5 to 1.5 in. long, .25 to .5 in. wide, slightly crenate, base cuneate, upper edge auricled, lower oblique papery, rachis villous as is whole pinna when young. Sori near the edge. Indusium cordate. *Hab.* Climbing on trees, rare. Selangor, Batu Caves (Matthew). *Distrib.* Africa, Ceylon, Philippines, Christmas island, Australasia.

Separated under the genus *Arthropteris* Sm., on account of its articulated stipes.

## 42. **Cyclopeltis** Sm.

Rhizome decumbent. Stipes not articulate. Fronds pinnate, pinnae articulate to rachis, veins free, forked or branched. Sori dorsal or terminal round in 1 to 4 rows on each side of the midrib. Indusium peltate. Two species; Indo-Malaya, Trop. America.

(1). ***C. semicordata*** J. Sm. Bot. Mag. 72, Comp. 36. *Polystichum semicordatum* Sw. Syn. Fil. p. 45. Stipes fairly stout, scaly at base, 12 to 18 in. long. Frond simply pinnate, 2 to 3 feet long; pinnae nearly entire oblong acuminate, base cordate or truncate firmly herbaceous, 4 to 5.5 in. long, .4 to 1 in. wide, sessile; nerves very numerous, pinnate. Sori small in 3 rows, inner line close to midrib regular, the others rather scattered. *Hab.* Pahang, Tanjong Antan, Pahang river (Ridley). Perak, Kwala Dipang (Kunstler 8282); Lenggong (Ridley 14212); Kamuning (Ridley 11892). *Distrib.* Burmah, Malay isles, S. America.

In our form the rachis is usually very hairy.

## 43. **Polystichum** Roth.

Pinnate or bi-pinnate tufted ferns generally coriaceous, nerves all free. Sori sub-globose, dorsal or terminal on the nervules. Indusium orbicular fixed by centre. *Distrib.* Whole world.

(1) ***P. biaristatum*** Moore Ind. 86. *P. aculeatum* Sw. var. *biaristatum* Bedd. Tufted ferns. Stipes 6 to 12 in. long, scaly and fibrilled below and sometimes all through. Fronds large, ovate lanceolate bi-pinnate, coriaceous; pinnae lanceolate, pinnules oblong falcate sparingly serrate or spinulose. Sori generally along edge. *Hab.* Local on rocks at 2000 to 3000 feet alt. Perak, Thaiping Hills (Kunstler 6258). Penang above Richmond Pool. *Distrib.* India, Ceylon. Of species whole world.

(2). ***P. aristatum*** Presl. Tent. 83. Rhizome creeping, densely covered as are stipes with red scale hair. Stipes 6 to 12 in. long. Frond coriaceous deltoid 6 in. long, 5 in. wide; pinnae with a tendency to become bipinnate, pinnules sub-rhomboidal narrowed to base, lowest ones .5 in. long, lobes toothed, not aristate in our plant. *Hab.* Rare in mountains, Pahang, Gunong Tahan (Ridley 15966). *Distrib.* South India, Ceylon, Burma, Malay isles, China.

Very different from many plants included under this name, but I find similar forms from Borneo.

(3). ***P. lindseaefolium*** Scort. mss. Caudex short. Stipes 1 in. long or less tufted with thin lanceolate setaceous caudate coppery scales crowded at base, sparse on rachis. Fronds 6 in. long, pinnate; pinnae coriaceous obliquely ovoid, blunt, entire, upper basal angle prolonged, rounded, lower edge curved or nearly straight, base cuneate .4 in. long, .25 in. wide, ribbed when dry.

Main vein breaking before the edge; veinlets forked straight not anastomosing. Sori on the tips close to the edge about 12. *Hab.* Perak, (Scortechini). Kelantan, Gua Nenak, Sungei Keteh (Nur).

Near *Polystichum auriculatum* var. *caespitosum*, but the pinnae entire, short, round blunt.

### 44. **Didymochlaena** Desv.

Big fern. Fronds pinnate, pinnules articulate with rachis, and readily falling, obliquely oblong, very numerous; nerves subflabellate free. Sori elliptic terminal on a nerve, but intramarginal. Indusium elliptic. Species one.

(1). ***D. lunulata*** Desv. Mem. Soc. Linn. vi, p. 282. Stem short, thick, erect. Fronds tufted 4 to 6 feet long; pinnules .5 in. long, lower edge straight or slightly curved, upper rounded, slightly lobed, subcoriaceous. Sori 2 to 6 near upper edge, .5 in. long. *Hab.* Mountain woods, not rare 2000 to 4500 feet alt. Pahang, Fraser Hill (Burkill). Negri Sembilan, Bukit Tangga (Burkill). Selangor, Semangkok Pass (Ridley 8659). Perak, Gunong Chey 2600 ft. (Murton); Gunong Keledang (Ridley 9538); Thaiping Hills (Scortechini, Ridley); Gunong Kerbau (Robinson). *Distrib.* Mascarenes, Burma, Malaya, Polynesia, South America.

### 45. **Pleocnemia** Presl.

Large pinnate ferns with elongate pinnae, differing from the pinnate Sagenias (Aspidium) in their less compound venation, only the lower veins anastomose arcuately forming one series of areoles near the midrib, the other veins all free, or some angularly astomosing. Sori on the ends of the free veinlets outside the areoles. Indo-Malaya, Polynesia. Species 10.

(1). ***P. megalocarpa*** Bedd. Handb. Ind. Ferns Suppl. 48. Caudex erect, scaly at the crown. Stipes stout, 18 to 20 in. long scaly towards the base. Fronds 2 ft. or more long, oblong-deltoid pinnate; pinnae 10 in. long cut down to a broad rachis into narrow-oblong crenate lobes 1.5 in. long, .15 in. wide, thinly subcoriaceous; veins obscure forming areoles on the rachis, also anastomosing on the lobes but free towards the edge. Sori medium or nearly, on the veins in one row on each side of the midrib of lobe about 7 on each side. *Hab.* Forests, Perak, Larut 2000 to 2500 feet (Kunstler). *Distrib.* Java.

(2). ***P. gigantea*** Presl. Epimel. 259. Big tufted fern. Stipes 1 to 1.5 feet tall, grey, basal scales linear. Fronds pinnate or bipinnate 1.25 to 3 feet long deltoid or deltoid lanceolate, apices pinnatifid, lower part pinnate with 5 or 6 lateral pinnae shortly stalked 7 in. long, 2 in. wide cut more than half way to the rachis, lobes lanceolate acuminate .5 in. long, .25 in. wide slightly crenulate, texture membranous, glabrous or veins and

midrib scurfy above, veins very slender, lower ones forming long arches near the rachis of the pinna, the others forming wide areoles. Sori in a row each side of the midrib on the ends of short, free veinlets. Indusium reniform. *Hab.* Damp forests. Singapore, Bukit Timah (Ridley). Johor, Patani, Batu Pahat. Negri Sembilan, Tampin Hill (Goodenough); Perak, Larut (Kunstler). Penang, Pulau Betong (Curtis); *Distrib.* Ceylon, South India.

(3). ***P. membranifolia*** Presl. Rel. Haenk. 36, t. 5, fig. 3. Small fern. Stipes tufted, slender with black linear subulate scales especially at base, 12 in. or less long. Fronds seldom more than 12 in. long and about 6 in. wide deltoid pinnate with apex pinnatifid, lateral pinnae 2 or 3 pairs opposite or suboppos.te, pinnatifid 2 to 4 in. long, .75 to 1.25 in. wide, lobes round, entire, lowest pair largest, deltoid pinnatifid or pinnate, softly herbaceous, softly hairy. Fertile fronds similar to sterile or contracted, lower veins anastomosing and forming loops in sterile and simple fertile fronds, in contracted fertile fronds all veins free. Sori apical on free veinlets. Involucre reniform. *Hab.* Shady spots. Pahang, Tahan river (Ridley). Selangor, Batu Caves. Perak, Goping (Kunstler). *Distrib.* India.

(4). ***P. Leuzeana*** Pr. Tent. 184, t. 7, fig. 12. Stem tree-like, stout 6 to 10 in. tall, 3 to 4 in. through. Stipes 2 to 3 feet tall, densely hirsute at base with long linear narrow dark brown or golden brown hair-like scales. Fronds 6 feet long, subdeltoid, bi- to tripinnate; pinnae 12 to 17 in. long, 6 to 8 in. wide simple but the lower ones with 2 or 3 large secondary pinnae from the lower side which are again pinnate, pinnules stalked 2 to 4 in. long deeply pinnatifid, lobes oblong rounded, short. Veins lower anastomosing in long arches along the costa, other veins free. Sori numerous about 8 pairs in a row each side of the midrib. Indusium reniform soon falling. *Hab.* Dense forest, Singapore, Cascade Valley, Bukit Timah (Matthew). Malacca (Cantley). Perak, Larut and Goping (Kunstler). *Distrib.* Indo-Malaya, China, Australia.

(5). ***P. membranacea*** Bedd. Handb. 225. *P. devexa* v. A. v. R. Malayan ferns 174. Stipes tufted to 9 in. long, straw-coloured, scales at base linear. Fronds about 18 in. long or less deltoid, bi- to tripinnate, apex pinnatifid, lowest pair of pinnae much the largest, long-stalked, lowest secondary pinnae stalked again and quite pinnate, pinnules stalked, and deeply pinnatifid, texture thin membranous, upper surface hairy towards the edge, midrib and veins puberulous. Veins, lower forming long arches, the rest free. Sori at the ends of free veins orbicular or reniform. *Hab.* Shady woods. Selangor, Batu Caves. Perak, Larut (Scortechini, Kunstler). Kelantan, Sungei Ketek (Nur). *Distrib.* Ceylon, Malay isles, China.

## 46. **Lastraea** Presl.

Tufted ferns with pinnate or compound 2 to 4 pinnate fronds; nerves all free. Sori subglobose dorsal or terminal on veins. Indusium reniform attached by the sinus. Whole World, numerous,

*Lastraea* and *Nephrodium* are now usually combined in the genus *Dryopteris*.

(1). ***L. crassifolia*** Bl. *L. nephrodioides* Bedd. F.B.I. t. 199. Large tufted fern. Stipes 1.5 feet tall, rather stout, slightly hairy above. Fronds deltoid-ovate coriaceous, pinnate about 2 feet long. Rachis costa and costules sparsely hairy; pinnae 5 in. long or less, 1 in. or more wide, very shortly petioled, oblong long-acuminate, lobes linear-oblong blunt, slightly falcate entire. Sori median on the rather prominent nervules; nervules 10 on each side prominent on both sides. *Hab.* Common, woods. Singapore, Sungei Morai (Ridley 4397); Bukit Panjang (12532); Jurong (10774). Johor, Tanjong Kupang (Ridley 6556). Malacca, Sungei Hudang; Ulu Bumban (Hervey); Gunong Mering, Ophir (Ridley 3335). Pahang, Kota Glanggi, (Ridley 2159); Fraser Hill (Burkill). Selangor, Bukit Kutu (Ridley 7858); Semangkok Pass (8654). Perak, Thaiping (Matthew); Ulu Bubong 10232, Sungkai 3034, and Larut 3814 (Kunstler). Penang, Mount Elvira (Curtis); Road to Penara Bukit (Ridley 7156). *Distrib.* Burma, Malay isles. *Native name.* Paku Kuau.

(2). ***L. gracilescens*** Moore Ind. 93. Bl. Enum. Pl. Jav. Fil. t. 253. Rootstock ascending. Stipes scaly large, scales acuminate at base, above pubescent, slender, about 6 to 12 in. long. Fronds simply pinnate, rachis and rachis of pinnae soft tomentose; pinnae narrow linear acuminate, 3 in. long, .25 in. wide cut down into numerous close lanceolate acute lobes with simple pinnate nerves bearing two rows of large medial sori. Sori round. Indusium orbicular. *Hab.* Mountain forests, not common. Perak, Thaiping Hills 4200 ft. alt. (Bishop Hose 293. Scortechini.) *Distrib.* India, China, Japan, Java.

(3). ***L. unidentata*** Bedd. F. B. I. Supp. 53. Stem unknown. Stipe 4 to 8 in. (nearly 2 ft. Beddome) densely villous with soft hair. Fronds 2 to 3 feet long pinnate, lower pinnae not smaller than upper ones but deflexed. Pinnae about 7 in. long, 1 to 1.25 in. wide cut down nearly to rachis into narrow oblong blunt lobes, nearly entire except for a large tooth-like lobe at one side on base, most prominent in lower pinnae (I do not see it at all in the only specimen and top of the frond I have seen) rachis of pinnae strigose above with long white hairs beneath, midrib slightly hairy; nerves 10 to 12 pairs. Sori median. Indusium persistent. *Hab.* Selangor, Rawang (Kloss). Perak, Gunong Bubu, dense jungle 500 to 3000 feet (Kunstler 7434).

(4). ***L. cana*** Bak. Hook. Syn. Fil. 267. Stipes densely tufted 6 to 10 in. long finely villous. Fronds 8 to 12 in. long

elongate, lanceolate not narrowed at the base, hairy all over; pinnae 2.75 in. long, .25 in. wide, oblong linear, lobed to near base, lobes very numerous and close oblong blunt; nervelets 6 to 8 on a side. Sori 5 in a row near the edge and close together. Indusium reniform. *Hab.* Selangor. Bukit Hitam (Ridley 7859).

(5). ***L. calcarata*** Hook. Sp. Fil. iv. 93. var *sericea* Bedd. Small tufted plant about 6 in. tall, rhizome stout short. Fronds lanceolate pinnate, 4 in. long, 1.5 in. wide. Stipes shorter with the rachis hairy; pinnules lanceolate narrow, shortly lobed, lobes round or subacute or blunt often hairy on edge, 1 in. long, .25 in. wide; nerves simple 3 to 8 on a side. Sori medial or nearly at base. Indusium hairy. *Hab.* Jungle in mountain districts. Johor, Foot of Gunong Pulai (Matthew). Pahang, Telom (Ridley 13979) Fraser Hill (Burkill and Holttum 8790). Perak, Sira Rimau 900 feet on river banks (Yapp 534). Kelantan, Kwala Perlang (Haniff).

(6). ***L. viscosa*** Hook. Syn. Fil. 264. Stem short thick. Stipes scaly with rather large acuminate scales or nude 6 in. or more, redbrown, softly finely villous. Fronds oblong lanceolate, 9 to 12 in. long, 4 to 5 in. wide deep green; pinnae close, lowest ones reflexed cut to near rachis into close linear oblong blunt lobes short and under .1 in. wide; rachis villous beneath glandular and sticky; nervelets 5 to 6 pairs. Sori median. *Hab.* Mountains. Malacca, Mount Ophir (Wight, Cuming 401). Pahang, Gunong Tahan (Ridley 15969). Selangor, Ulu Langat (Kloss); Batu Caves (Matthew). *Distrib.* Malay isles.

Matthew's specimen is a sterile one very large, stipe 14 in. long, frond as long and 8 in. wide, light green. He notes "To 4 feet, under surface peculiarly sticky."

(7). ***L. Ridleyi*** Bedd. Kew Bull. 1909 p. 423. Rhizome erect stout. Stipes tufted thickly red-scaly, 3 in. long, puberulous. Fronds 6 in. long, 1.75 in. wide, narrow-oblong pinnate; pinnae drying nearly black 18 to 20 pairs, coriaceous, .75 in. long, .2 in. wide, cut into oblong blunt lobes, crenate minutely ciliate; nervules undivided. Sori 1 to 3 on a lobe median. *Hab.* Mountains. Pahang, Kwala Tahan. Malacca, Base of Ophir. Selangor, Bukit Hitam (Ridley 7849). Perak, Bujong Malacca (Ridley 9600).

Beddome states it is allied to *L. Thelypteris* var. *squamulosa*. To me it much resembles *L. calcarata*.

(8). ***L. Robinsoni*** Ridl. Tufted fern. Stipes crowded rather stout black shining with long brown lanceolate acuminate scales at the base 6 in. long. Fronds chartaceous simply pinnate rachis pale hairy, 7 to 8 in. long, 3 to 4 in. wide; pinnae lanceolate, 1.5 in. long, .25 in. wide, deeply lobed nearly to midrib, basal ones deflexed, lobes oblong blunt hairy above especially on the sides of the tips, veins free to the edge. Sori circular 3 to 5 on

each side of the main vein. *Hab.* Mountains. Perak, Gunong Kerbau (Robinson). Kedah, Gunong Bintang on the Perak Boundary (Kloss).

Near *L. viscosa* and *L. Ridleyi*, but much more hairy.

(9). ***L. immersa*** Moore Ind. lxxxix. Stem creeping. Stipes long, 3 to 4 feet. Fronds large pinnate, coriaceous, oblong in outline; pinnae 6 to 10 in. long, 1 in. wide cut down close to the rachis into linear blunt lobes, .5 in. long, .1 in. wide, rachis hairy both sides. Sori in two rows, round immersed and raised with depressed centre on upper side. Indusium reniform, but appearing orbicular. *Hab.* Common in woods. Pahang, Kwala Tahan (Ridley). Malacca, Mt. Ophir (Herb. Hooker). Negri Sembilan, Gunong Angsi, (Nur). Selangor, Bukit Kutu (Ridley 7848); Batu Caves (8147) and Semangkok Pass (8658). Perak, Batu Gajah; Kal (10502); Goping (827) (Kunstler) and Sungei Rayan (941 Kunstler). Perlis (Matthew). *Distrib.* Malay islands.

(10). ***L. Dayi*** Bedd. Journ. Bot. xxv. 1887 p. 328. Stem erect short. Stipes 1 to 2 feet long straw-colored glabrous, or a few scales at base. Fronds 1.5 to 2 feet long; pinnae 5 to 6 in. long, .75 to 1 in. wide cut nearly to rachis into linear oblong lobes, .1 in. wide papery-herbaceous, glabrous except rachis above puberulous; nerves 6 to 8 on a side not reaching margin. Sori at the tips. Involucre reniform persistent. *Hab.* Singapore (Bishop Hose "I have also found it in Singapore but little above sea level"). Pahang, Telom (Ridley 13983). Perak, Thaiping Hills 3000 feet (Bishop Hose, Kunstler 4122). Penang (Matthew).

(11). ***L. fuscipes*** Wall. Cat. 361. Stipes tufted purple brown polished, scaly at base, 6 to 12 in. long. Fronds 12 to 24 in. long, 6 to 12 in. wide; pinnae 5 in. long, 1 in. wide, lowest pair slightly shorter, deflexed, lobes about 14 pairs cut down to a broad winged rachis linear oblong blunt, entire or slightly crenate, herbaceous; nervules 6 to 8 pairs simple or forked. Sori generally apical on a nervule. Indusium reniform fugacious. *Hab.* Forest Singapore, Bukit Timah (Ridley 5874). Johor, (Matthew). Negri Sembilan, Gunong Angsi (Nur). Perak, Ulu Kerling (Kunstler 8742); Ulu Temengoh (Ridley 14194). Penang (Mactier). *Distrib.* Burma, Philippines.

(12). ***L. singalanensis*** Bedd. F.B.I. Supp. 52. *Nephrodium singalanensis* Bak. Journ. Bot. 1880, 212. Stem short ascending. Stipes 12 in. long. Fronds lanceolate 2 feet pinnate, rachis straw-colored nearly glabrous; pinnae 7 in. long, narrow-linear acuminate with a long point, cut down into narrow oblong acute lobes nearly to base, .75 in. long .1 in. wide, herbaceous, under surface black dotted, nervules 10 pairs. Sori medial. *Hab.* Mountains. Pahang, Fraser Hill 4000 to 4370 feet (Burkill and Holttum 8811). Perak, Thaiping Hills 3500 to 4000 feet alt. (Kunstler 8520). *Distrib.* Sumatra.

(13). ***L. filix-mas*** Hook. Syn. Fil. p. 272. var ***parallelogramma*** Hook. Sp. Fil. iv. 116. Tufted fern. Fronds 2 to 3 feet tall, 7 in. across pinnate; pinnae numerous lanceolate cut down nearly to the midrib into about 40 oblong blunt rounded entire (or serrate) lobes, .2 in. long, .1 in. wide, rachis of frond fibrillose with black fibrils, midrib pubescent on both sides; veins pinnate, upper ones forked. Sori medial, involucre large reniform. *Hab.* Lankawi, Gunong Raya, (Haniff). *Distrib.* Most of the world except Australia and southern South America.

This form of this very variable fern is nearest to Wallich's *L. patentissima,* common in India.

var. ***cochleata*** Don. Prod. Fl. Nep. 6. Tufted fern. Fronds 4 feet long and 1 foot wide, generally dimorphic, pinnate or subpinnate in barren, bipinnate in sterile; stipes more or less clothed with scales. Pinnae 4 in. long, with oblong round-tipped rather distant lobes cut down to the base and completely covered with very large indusia. Sori close packed. *Hab.* Malay Peninsula (Norris).

A scrap from Norris's herbarium probably from Penang if collected in the Malay Peninsula at all.

(14). ***L. syrmatica*** (Willd.) Bedd. F.B.I. 243. Stipes tufted, 1 to 2 feet, straw colour when dry. Fronds 5 ft. long pinnate, pinnae shortly stalked to 12 in. long, 1.5 in. wide, subcoriaceous, cut down to a broad winged rachis into oblong blunt crenulate lobes with a tooth between them; nerves all forked 10 to 15 on a side. Sori small one row on each side near the margin median. Indusium reniform. *Hab.* Forests 200 to 6000 ft. alt. Selangor, Dusun Tua (Ridley 7861). Perak, Goping (Kunstler 8178); Larut (2868); Temengoh (Ridley 14214); Gunong Kerbau (Native collector, Ridley 14742). Penang, Waterfall (Curtis 3071) *Distrib.* India, Burma, Malay isles.

(15). ***L. flaccida*** Hook. Syn. Fil. 274. Stipes tufted 12 in. long, slender glabrous. Fronds 1 to 1.5 in. long; pinnae very flaccid and membranous 3 to 4 in. long, nearly 1 in. wide cut to the rachis but joined at base so that rachis is winged, pinnules oblong .4 in. long, .1 in. wide shortly blunt, toothed, hairy as is rachis with long white weak hairs above, brownish needle-like ones below. Sori terminal. Indusium small, reniform. Perak, Maxwell's Hill 3000 ft. (Day) fide Matthew. *Distrib.* India, China, Java.

(16) ***L. splendens*** Hook. Syn. Fil. 282. Stipes 2 to 3 ft. long, stout, polished scaly chestnut colour. Fronds long lanceolate to 4 ft. long 1.5 ft. wide, bipinnate; pinnae narrow lanceolate 2 in. broad, pinnules 20 to 30 pairs .25 in. wide, lanceolate oblong, tip round, lobed, lobes serrate subcoriaceous. Sori large

forming 2 rows near the costa. *Hab.* Selangor, Menuang Gasing (Kloss). Penang? (Norris). This seems to me very near *L. sparsa* Don. *Distrib.* India, China.

(17). ***L. sparsa*** Don Prod. Fl. Nep. 6. Rhizome suberect, densely covered with lanceolate linear golden or reddish scales. Stipes 12 in. to 18 in. with large scattered scales, rather stout. Frond over 12 in. long, 8 in. wide, bipinnate-tripinnate pinnae 7 in. long. Ultimate segments oblong coarsely crenate dentate subcoriaceous; nerves pinnate shorter than margin. Sori large 6 to 8 on a lobe. *Hab.* Rare. Perak, Maxwell's Hill 1500 ft. alt. (Matthew). Distrib. India, China, Mauritius.

(18). ***L. padangensis*** Bedd. F.B.I. Supp. 60. Stem short erect. Stipes 8 to 9 in. long covered as is rachis, partial rachis and nerves of pinnules with bristle-like hairs black, and scurfy. Frond 1 to 2 ft. long, deltoid lanceolate pinnate lower pinnae bipinnate, lowest pinnae largest, lowest pinnules elongate, upper pinnae 2.5 to 4 in. long, pinnules .5 to .75 in. long, lower ones cut nearly to rachis into lanceolate entire or crenulate lobes sparsely hairy both sides. Sori medial. *Hab.* Perak, Batang Padang, edge of Padang river (Kunstler 8038); Ulu Temengoh (Ridley 14198). Kelantan, Kwala Rek (Haniff).

(19). ***L. intermedia*** Bl. Enum. Fil. Java p. 161. Stipe, rachis etc. covered with long pointed linear red scales. Fronds 1 to 1.5 ft. long, 6 to 9 in. wide deltoid lanceolate, lower pinnae lanceolate, pinnules close, lanceolate, segments oblong lanceolate, entire or deeply incised, sparsely hairy above. Sori small, median on nerves. Indusium reniform. *Hab.* Perak (Day). Penang (Curtis).

var. ***Blumei*** Fronds much larger tripinnate. Perak (Scortechini); Larut (Kunstler 6952). *Distrib.* Tropical Asia, China, Japan.

(20). ***L. tenericaulis*** Wall. (*Polypodium* Cat. 335) Stem erect. Stipes tufted a little scaly below, covered with a bluish glaucous bloom, slender, rachis with a line of hairs on grooved upper side. Fronds 1 to 3 ft. long, ovate-lanceolate acuminate, membranous bipinnate, the rachis with thick hair on upper side. Lobes of pinnules narrow linear oblong, toothed, cut nearly to the winged rachis. Sori median or terminal 6 pairs on each lobe with long white hairs. *Hab.* Woods. Singapore, very abundant at Tanglin. Penang, Waterfall (Curtis 3100). *Distrib.* Tropical Asia, Polynesia.

Easily recognised by its glaucous stem and hairy fronds.

(21). ***L. megaphylla*** Bak. Journ. Linn. Soc, xxii. 227. A large compound fern. Fronds 3 to 5 ft. long, bipinnate tripinnatifid primary pinnae distinctly stalked 16 in. or more long, secondary pinnae on short stalks, narrow lanceolate, 3 in. long .75

in. wide cut down to a winged rachis into oblong broad short lobes; nerves pinnate, forked at tips. Sori medial on upper branch of nerves 4 or 5 pairs on a lobe. Indusium reniform persistent. *Hab.* Perak, Larut Hills 3 to 4000 ft. (Kunstler 6952, 2822). *Distrib.* Africa, India, Malaya.

(22). ***L. chupengensis*** Hook. fil. in Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 232. A very small bright green fern 2 to 5 in. tall. Rhizome creeping, glabrous. Stipes 1.5 to 2 in. tall, pale green, slender. Fronds up to 3 in. long 1.5 in. wide at base, bipinnate, lowest pinnae longest, 1 in. long cut half way to the rachis, lobes oblong rounded often bilobed or trilobed at the tip, thinly membranous, above sparsely hairy, rachis with scattered white hairs, veins forked in the lobes. Sori reniform apical on a short veinlet below the apex. *Hab.* Limestone caves, rare. Perlis a single patch found in the mouth of a cave, Chupeng (Ridley).

Allied to *L. Parishii* Bedd. of Moulmein.

**Dubious species.**

*Lastrea* (*Dryopteris*) *Norrisii* Rosenstock Medeel. Rijks. Herb. Lud. 31, p. 8. Species with habit and nervation of *megaphylla,* fronds entirely shortly hairy pilose, no abortive pinnae terminal one largely increased, by covering and nervation differing from *D. brachyodon.* Malay Peninsula (Norris).

Diagnosis insufficient, I have not seen it.

*L. Thelypteris* Desv. Perak, Tea Gardens (Ridley 3058). This was so named by Christ. I am doubtful of it, and have not the specimen to refer to. It is a most improbable locality for this plant.

*L. odorata* (Bak.) Given for Malacca by v. A. v. Rosenberg, and Malay Peninsula. I have seen no specimen from the Malay Peninsula.

47. **Nephrodium** Schott.

Caudex erect or creeping. Fronds simply pinnate with pinnatifid pinnae. Sori subglobose, dorsal on the veins. Indusium reniform (sometimes absent). Veins pinnate one or more pairs anastomosing angularly with an excurrent veinlet from their junction which is either free or joined in the angle of the next superior pair. *Distrib.* Whole world, species very numerous.

(1). ***N. lineatum*** Presl. Enum. Bot. p. 48. Rhizome short creeping. Stipes slender glabrous or with a few brown scales at the base 1 foot or more long. Fronds 1 to 4 ft. long, rachis appressed villous; pinnae distant, sterile herbaceous oblong acuminate, base truncate auricled above, 3 in. long, 1.75 in. wide, edge undulate or serrate; fertile pinnae 2 in. long, .25 in. wide linear-oblong, base truncate auricled or not, very shortly serrate,

veins 8 to 10 pairs. Sori one to each vein about the centre. *Hab.* Pahang, Sungei Merapok (Nur). Perak (Bishop Hose, Scortechini); Goping (Kunstler). *Distrib.* Malay isles.

(2). ***N. pteroides*** (Retz, Polypodium) Hook. Syn. Fil. 289, *N. terminans* Wall. Cat. 386, Hook. Sp. Fil. iv, 73. Rhizome long and stout. Stipes up to 2 ft. tall, sparsely brown, scaly at base. Fronds 2 to 4 feet long or more and often 2 feet wide, pinnate; pinnae spreading .75 to nearly an inch wide, acuminate with a long, nearly entire point, lower pinnae not reduced, cut down only one third, lobes oblong triangular acute, herbaceous, glabrous above, glandular pubescent on all the veins; veins pinnate 6 to 9, lowest pair anastomosing with a free excurrent veinlet. Sori on the apex of the lobes to 6 on a side. *Hab.* Damp spots. Singapore, Bukit Timah. Johor, Minyak Buku; Bukit Soga, Batu Pahat. Malacca (Griffith). Dindings, Lumut; Pulau Sembilan. Perak, Thaiping Hills, Maxwell's Hill. Penang (Wallich) Waterfall (Curtis). Kedah, Alor Star, Lankawi (Ridley). Pulau Adang. Perlis, Kanga. *Distrib.* Indo-Malaya.

(3). ***N. extensum*** Bl. Enum. Pl. Jav. Fil. 156. (Aspidium) Rhizome stout, long creeping. Stipes 2 feet or less sometimes slightly pubescent, fronds 4 feet long or less and 1.5 feet wide acuminate; pinnae .75 in. wide, lower ones not reduced, cut down two thirds of their width or more into linear-oblong falcate slightly crenulate lobes, subherbaceous; rachis glabrous or with a few hairs, veins beneath, glandular pubescent, pinnate 10 to 13 pairs, lowest pairs anastomosing at an angle with a free excurrent veinlet, or running free up to the sinus. Sori towards the tips of all the veins and on all except the one or two lowest pairs, often immersed. Indusium rounded reniform. *Hab.* Singapore Bukit Mandai (Matthew). Malacca (Hervey, Cuming). Penang Hill, (Wallich, Pinwill, Ridley and all collectors). Perlis (Matthew) *Distrib.* Indo-Malaya.

Near *N. pteroides* but with more deeply cut and stiffer fronds, and the sori more numerous.

(4). ***N. unitum*** (Linn.) R. Br. Prod. Fl. Nov. Hall 148. *N. gongylodes* Schott, Gen. Fil. t. 10. Rhizome creeping. Stipes rigid 1 to 1.5 ft. long. Fronds about 2 feet tall, stiff coriaceous, pinnate with numerous pinnae 3 to 5 in. long, .5 in. wide, lower ones not reduced, cut down about one-third into triangular acute lobes; veins pinnate 4 to 8 on each side, the lowest pair anastomose angularly with an excurrent veinlet which runs to the margin, above glabrous, shining, beneath usually very hairy. Sori terminal on the veins on the lower pinnae medial on the upper ones crowded. Indusium reniform hairy. *Hab.* Common in damp spots. Singapore (Wallich, *Polypodium secundum* 301); Selitar; Gaylang.

Johor, Tanjong Kupang. Malacca, Ayer Panas. Perak (Day, King). Kedah, Alor Star, Setul Heath. *Hab.* All tropics *Native name.* Paku Hudang.

(5). ***N. aridum*** Hook. fil. Syn. Fil. p. 291. Stipes stout 12 in. or more long, puberulous. Fronds 3 or 4 feet long, 12 to 18 in. wide; pinnae rather distant linear acuminate, base broad, 6 to 9 in. long, .75 to 1 in. wide cut one third of the way down into subtriangular acute lobes, coriaceous, midrib and underside hairy, veinlets 6 to 10 on each side, 5 or 6 anastomosing. Sori on all or most veinlets half way between midrib and edge. *Hab.* Dry or wet spots, Singapore (Wallich) Jurong; Kranji, (Ridley); Green Hill (Hullett). Johor, Castlewood; Kluang (Holttum). Pahang, Pekan, Perak, Ulu Selama (Yapp, Kunstler). Kelantan, Riverside (Haniff). Gunong Sitong (Nur). *Distrib.* North India to Assam, Malay isles.

(6). ***N. cucullatum*** Bl. Enum. Pl. Jav. 151 (Aspidium) Rhizome creeping. Stipes stout 12 in. long, hairy. Frond about 1 to 2 feet long, rachis hairy; pinnae very coriaceous linear acuminate, not narrowed at the base, 3 to 6 in. long and .5 in. wide, numerous and close, cut down hardly one third, lobes triangular falcate acute; the lowest pinnae suddenly reduced to short auricles, under surface of pinnae very hairy, veins 8 to 10 pairs, the 3 to 5 lower ones uniting. Sori near tip of the veins all of which are soriferous. Indusium persistent conspicuous. *Hab.* Common in dry spots. Singapore near General Hospital; Chan Chu Kang; Changi. Johor, Tanjong Merawang. Malacca (Griffith); Bukit Bruang. Negri Sembilan, Seremban. Penang Waterfall (Curtis). *Distrib.* Mauritius, South India, Malaya, Polynesia.

(7). ***N. Haenkeanum*** Presl. Epim. 46. Hook. Syn. Fil. 290. Stipes 1 to 2 feet tall, stout, pubescent. Frond 3 to 4 feet long, 12 to 18 in. wide; pinnae 6 to 8 in. long, .75 in. wide, texture subcoriaceous cut from one third to halfway down, into acute subfalcate oblong lobes, rachis, midribs and veins finely pubescent; veinlets 10 pairs. Sori terminal or subterminal, on all veinlets. *Hab.* Forests, Singapore, Bukit Mandai (Ridley); Bukit Timah (Matthew). *Distrib.* Ceylon, Malay isles to Fiji.

Allied to *N. cucullatum* but much larger and less hairy, veinlets more numerous and indusium more fugacious.

(8). ***N. ochthodes*** Kze. (Aspidium) Linnaea xxiv. 282. Stem erect. Stipes tufted 1 to 2 ft., naked. Fronds 2 to 4 ft. long, 8 to 12 in. wide. Pinnae .75 to 1 in. wide cut down nearly to rachis into entire blunt often falcate lobes .1 in. wide with a prominent gland at base beneath, lower ones reduced, rachis and underside more or less villous, subcoriaceous; nerves 10 to 15 on

a side. Sori submarginal. *Hab.* Singapore, Chan Chu Kang (Ridley 9843). Penang, Balik Pulau (Ridley 9579). *Distrib.* India.

(9). ***N. glandulosum*** Hook. Sp. Fil. iv. 16. Stipes rather slender with the main rachis closely appressed villous 8 in. or more long. Frond 12 in. long, appressed strigose or pustular above; pinnae oblong acute, base truncate broad, subentire or serrate or shortly pinnatifid hardly one sixth the way down, distant, 1.75 to 4 in. long, .5 to 1 in. wide, terminal one larger sometimes ovate-oblong serrate 6 in. long, 2 in. wide; veinlets beneath elevate, minutely hairy 6 or 7 pairs. Sori large halfway on the veinlet. Indusium reniform prominent. *Hab.* Forests, Singapore, Bukit Timah (Ridley). Malacca (Griffith). Perak, Ulu Kerling (Kunstler); Maxwell's Hill (Matthew). *Distrib.* Java, Sumatra, Philippines.

(10). ***N. urophyllum*** Wall Cat. 299. Rhizome short creeping. Stipes 2 feet or more long, stout with brown lanceolate scales at the base. Fronds 1 to 4 feet long; pinnae linear-oblong subsessile caudate acuminate 6 to 12 in. long, 1 to 2 in. wide, edge serrate; rachis and nerves beneath pubescent or hairy, minutely pustular subcoriaceous, veins 8 to 14 pairs, all anastomosing. Sori one to each vein usually about halfway. Indusium reniform usually absent. *Hab.* Common in forests. Singapore, Bukit Timah. Malacca Bukit Besar, Mount Ophir (Ridley); Bukit Bruang (Derry). Pahang Temerloh; Kota Glanggi; Tahan River. Sungei Ujong, Bukit Danan (Cantley). Selangor, Sungei Buluh (Ridley); Batu Caves; Ginting Bidai (Ridley). Perak, Slim (Kunstler). Penang Hill (Norris, Wallich and all collectors). Lankawi, Gunong Raya (Curtis). Kelantan, Kampong Kohang (Haniff). *Distrib.* Indo-Malaya. *Native names*: Paku Gajah; Paku Merah.

var. ***Pinwillei*** Bedd. Pinnae lanceolate, very broad in the middle attenuated at both ends often long caudate, edges sharply serrate. Malacca (Pinwill). Perak (Day).

(11). ***N. moulmeinense*** Bedd. Handb. Supp. p. 18. Ferns of British India p. 275, fig. 141. Rhizome creeping. Stipes stiff, 2 ft. or more long. Fronds up to 2 ft. long; pinnae numerous, coriaceous, narrow-oblong 12 in. long, 1.5 to 2 in. wide caudate, edge serrate or crenate serrate, often obscure, veins 16 to 21 pairs, sori medial or near the tip. Indusium usually conspicuous reniform. *Hab.* Singapore, Bukit Timah (Ridley) Johor, Gunong Pulai (Ridley). *Distrib.* India, Burma.

(12). ***N. multilineatum*** Bedd. Handbook Supp. 80. *N. pennigerum* Moore Ind. 1000 (not Hook.) Stem erect, short. Stipes villous rather stout 12 in. long, base scaly. Fronds herbaceous, 4 feet tall or less, pinnate, lower pinnae reduced to ovate entire lobes, .25 in. long paired, rachis villous; pinnae oblong-linear

long acuminate, base broad and truncate, edge cut into very short blunt lobes, sometimes as much as 1 in. deep, glabrous beneath or nearly so; veins 8 to 12 pairs, lower ones at least anastomosing. Sori medial on the veins. Indusium reniform persistent. *Hab.* Common in woods, Singapore, Rifle Range, Tanglin (Ridley). Johor, Pinerong (Cantley). Selangor, Dusun Tua and Semangkok Pass. Perak, Maxwell's Hill (Scortechini). Penang (Wallich, Hullett). *Distrib.* Malay isles.

(13). ***N. indicum*** Ridl. *Dryopteris indica* v. A. v. R. *N. pennigerum* var. *malayense* Bedd. Rhizome erect or shortly creeping. Stipes nearly naked, 4 feet tall. Frond pinnate; pinnae lanceolate numerous, distant spreading herbaceous, cut down half way into oblong upcurved sub-acute lobes, rachis and rachilla pubescent and sometimes all hairy beneath; veins 8 to 12 pairs pubescent. Sori medial 8 to 12. Indusium persistent. *Hab.* Rare in mountains, Perak, Larut 3500 feet alt. (Kunstler).

(14). ***N. molle*** Desv. Mem. Soc. Linn. vi. 258. Tufted plant. Stipe hairy or glabrous, 6 to 12 in. tall. Frond herbaceous oblong lanceolate pilose on both sides; lower pinnae usually reduced to auricles; upper pinnae spreading lanceolate-linear acuminate, base broad truncate, cut down half way or less into blunt slightly falcate lobes, veins 6 to 8 pairs, lowest pair anastomosing. Sori median. Involucres reniform, glabrous or hairy. *Hab.* Common in woods and shady places and very variable. Typical; Singapore, Selitar; Chan Chu Kang; Bukit Timah; Changi; Pulau Brani (Hullett). Johor, Castlewood (Ridley), Malacca (Griffith). Selangor, Bukit Hitam (Ridley) (var. *major*). Perak, Ulu Bubong and Ulu Kerling (Kunstler). Penang (Kunstler etc.).

Var. ***minor.*** Slender very hairy. Frond 12 to 15 in. long 4 to 6 in. wide; pinnae .25 in. wide deeply cut. *Hab.* Malacca, Gunong Mering, Mt. Ophir (Ridley 3212). Prov. Wellesley, Permatang Bertam (Ridley 6963). Perak, Ulu Temengoh (Ridley 14196).

Var. ***amboinense*** Presl. Fronds small, papery, nearly glabrous, pinnae less cut often only crenate, gradually reduced towards the base, lower ones often hastate and very acuminate, veins 4 to 5 pairs, 2, rarely 3 lowest anastomosing. Sori sometimes confined to the lowest pair. *Hab.* Common with type *molle*. Singapore, Green Hill (Hullett). Pahang, Khol, Tembeling river (Ridley). Selangor Dusun Tua. Perak, Telok Pinang (Ridley); Bernam river (Kunstler).

Var. ***procurrens*** Bak. Rhizome long creeping. *Hab.* Singapore (Wallich), Bukit Timah (Ridley). Perak, Ulu Kerling; Ulu Bubong (Kunstler).

Var. ***didymosorum*** Bedd. *N. tectum* Wall. Rhizome very hairy pinnae not reduced at base. Sori on 2 lower veinlets. Singapore (Wallich *Aspidium canescens*).

(15). ***N. truncatum*** Presl. Tent. Pterid. 81. *Aspidium multilineatum* Wall. Cat. 353. Rhizome short erect. Stipes tufted stout up to 3 feet long, usually glabrous. Fronds up to 4 feet long; lower pinnae reduced to auricles; pinnae herbaceous, glabrous except midrib on both sides, usually pubescent, 6 to 8 in. long, .25 to .6 in. wide, cut down about half way to the rachis; lobes oblong square and slightly crenate at the top; veins 6 to 9 pairs, usually 2, rarely 3 or 4 anastomose. Sori small medial or nearer to costa than the edge. Indusium reniform. *Hab.* Shady spots, common, Singapore, Sungei Jurong (Ridley). Johor, Batu Pahat; Ulu Kahang (Holttum). Selangor, Batu caves. Perak, Telok Pinang and Tambun (Ridley); Goping (Kunstler); Maxwell's Hill (Scortechini); Gunong Kerbau 5000 feet (Robinson). Penang Waterfall (Curtis, Wallich). Kelantan, Sungei Keteh (Nur). *Distrib.* Indo-Malaya, Australia.

(16). ***N. brachyodon*** Hook. Syn. Fil. 295. Stipes tufted naked 1 to 2 feet long. Fronds up to 3 feet long, sub-coriaceous; rachis slightly pubescent, and partial rachis and midrib hairy, otherwise glabrous; pinnae usually distinctly petiolate, lanceolate-linear base cuneate, tip acuminate, 6 to 9 in. long, 1.25 to 1.75 in. wide, cut into oblong, blunt oblique falcate lobes one third to two thirds of the distance to midrib; veins 8 to 12, all free, or the lowest ones anastomosing; a single vein often rises from the midrib between the pinnules and runs to the edge. Sori medial on the veins. Involucre reniform. *Hab.* Hill forests, scarce. Perak, Maxwell's Hill (Scortechini); Bujong Malacca (Ridley). Penang (Norris, Mactier) *Distrib.* West Indies and South America.

(17). ***N. ferox*** Moore Ind. 91. Tufted fern. Stipes 1 to 2 feet long covered with linear acuminate dark brown scales falling off leaving the stipes rough with short points. Frond 3 to 4 feet long rachis scabrid with short points; pinnae stiffly coriaceous, oblong linear acuminate, 8 to 14 in. long, .75 in. wide or more, cut down half to two thirds into oblong-linear blunt lobes, spreading, glabrous, veins prominent slender, 12 to 15 on each side, lower 5 or fewer anastomosing. Sori basal on veinlet close to the midrib, small. *Hab.* Forests from about 2000 feet upwards. Pahang, Fraser Hill (Burkill). Selangor, Ginting Peras; Ginting Bidai; Semangkok Pass (Ridley, Christ). Perak, Larut Hills (Kunstler), Bujong Malacca (Ridley). Penang Hill (Ridley).

Occasionally in young fronds the upper midrib and nerves are sparsely hairy. The *N. Ridleyi* Christ (Ridley, Ferns of the Malay Peninsula, Journ. Roy. As. Soc. S. Br. 1908, p. 38) was never published, it is merely I think a very robust and rough form.

(18) ***N. crinipes*** Hook. Syn. Fil. 294. Tufted fern, large. Stipe stout 1.5 ft. long, covered as is rachis with large lanceolate linear long-acuminate dark brown scales .15 in. long. Frond 2

to 3 feet long, 1 ft. wide; pinnae distant or in distant pairs, 4 to 6 in. long, .75 in. wide, cut down half to three quarters of the way, lobes oblong blunt (lowest ones reduced to auricles), base cuneate, tip acuminate, texture stiffly herbaceous, midrib and veins very hairy or in older fronds quite glabrous, veins 6 to 8 pairs, 2 lowest anastomosing. Sori medial towards the tip. Indusium reniform, glabrous persistent. *Hab.* Forests, Malacca (Griffith). Perak (Scortechini). Penang Hill (Ridley, Matthew). *Distrib.* India, to Assam.

(19). ***N. sakayense*** Zeiller Bull. Bot. Soc. France xxxii. 74. Fern 3 to 4 feet tall. Stipes densely tufted. Fronds ovate-lanceolate, rachis channelled above with hair-like scales and a few larger ones; pinnae linear-lanceolate acuminate 8 to 10 in. long $\frac{5}{8}$ in. wide, cut down more than one third into somewhat falcate obscurely crenulate lobes, glabrous, but finely glandular below with whitish needle-like hairs on the veins above; veins 8 to 11 pairs, 3 lower pairs anastomosing. Sori very small basal on the 4 or 5 lower veins. *Hab.* Perak, Valley of the Liang River near Gunong Riam, 2370 feet alt. (de Morgan).

(20). ***N. glaucostipes*** Bedd. Handbook Supp. 80. Stipes scaly at base, glaucous as is the rachis. Fronds 3 to 4 feet long. Lower pinnae very gradually reduced, at first small and hastate, then merely auricles to base of stipe; upper pinnae 5 to 6 in. long, .75 to .9 in. wide cut down half way into oblong rounded lobes, papyraceous glabrous except midrib above minutely villous; veins 10 pairs, 2 lower pairs anastomosing. Sori medial on all the veins. *Hab.* Forests 3 to 400 feet alt. Perak, Larut (Kunstler).

(21) ***N. perakense*** Bedd. Handbook Supp. 80. Caudex small erect. Stipes slender villous. Fronds pinnate villous with soft white hairs 12 to 14 in. long, 2 to 5 in. wide, oblong lanceolate, central pinnae the largest; lower ones gradually cut down to sagittate auricles; pinnae 1.5 to 2.5 in. long $\frac{3}{8}$ to .5 in. wide, cut down half way to rachis into close pointed lobes, texture softly herbaceous; veins 4 to 5 pairs, lower pair anastomosing with a long excurrent veinlet. Sori near tips of veins. *Hab.* Hill forests rare on exposed rocks. Perak, Thaiping Hills; Birch's Hill (Day).

(22). ***N. heterocarpum*** Bl. Enum. Fil. Jav. p. 155. Rhizome strong erect. Stipes tufted 1 to 2 feet long, villose. Fronds 2 to 3 feet long, 8 to 14 in. wide; pinnae 5 to 6 in. long, .75 in. wide linear acuminate base truncate, tip acuminate cut down $\frac{1}{3}$ or $\frac{1}{2}$ to rachis into linear-oblong truncate lobes; lower pinnae abrubtly reduced to auricles or only represented by glands; coriaceo-herbaceous, rachis villous, under suface glandular; veins above with few long white hairs, veinlets 8 to 10 (in the fertile fronds which are contracted only 5), lowest pair only anastomosing strigose. Sori medial or near base of veinlets. *Hab.* Ditches. Singapore, Green Hill (Hullett). Malacca (Pinwill). Negri

Sembilan, Perhentian Tinggi (Ridley). Pahang, Fraser Hill (Burkill and Holttum). Perak, Larut; Goping (Kunstler) 2500 to 3000 feet alt. *Distrib.* Malaya.

(23). ***N. costatum*** Wall. (Polypodium) 299/3. Beddome, F. B. I. i. t. 220. *Polypodium penangianum* Hook. Sp. Fil. v. 13. Stipes 18 in. or more long glabrous, glossy, red as is the rachis. Fronds 1 to 3 ft. long, broad oblong or lanceolate, submembranous, glabrous; pinnae numerous distant shortly petioled 5 to 8 in. long, .5 to 1 in. wide serrate with short close triangular acute teeth oblong linear acuminate, base cuneate, midrib red, occasionally hairy on veins beneath, veinlets 6 to 8 pairs all anastomosing ascending. Sori close to base of veinlet or half way. Indusium reniform fugacious. *Hab.* Penang (Wallich) *Distrib.* North India at considerable altitudes.

## 48. **Mesochlaena** Br.

Big tufted ferns with the habit and venation of *Nephrodium*. Fronds large, pinnate, with narrow lobes cut half way to rachis. Sori and indusium as in *Didymochlaena*. Species 2.

(1). ***M. polycarpa*** Bedd. F. B. I. t. 344. Stem short, erect, thick. Fronds 2 to 3 ft. long, 1 to 1.5 ft. wide pinnate. Pinnae close very numerous 6 to 9 in. long, .5 in. wide narrowing and shortening at base to mere auricles, cut down about halfway into linear-oblong lobes villous beneath; nerves very close pinnate, 12 or more on a lobe. Sori small, numerous eventually covering the lobe. *Hab.* In forests, common. Singapore, Bukit Timah (Ridley 1658, Wallich). Malacca (Griffith). Pahang, Pulau Padang (Ridley 2401) and Tahan river (2396). Negri Sembilan, Bukit Sumayiang (Cantley). Perak, Ulu Temengoh (Ridley 14219); Goping (Kunstler 557); Thaiping Hills (Scortechini, Robinson). *Distrib.* Malay isles.

(2). ***M. larutensis*** v. A. v. R. Malayan Ferns, 232. *N. larutense* Bedd. Ferns of Brit. India Supp. p. 73. Stipes 8 to 12 in. long densely villous with short hairs as is rachis. Fronds 2 to 3 ft. long; pinnae linear-oblong, long acuminate, base truncate 10 to 12 in. long, 1.5 in. wide cut down one fourth into oblong falcate blunt lobes, herbaceous, hairy on both sides, lowest ones reduced to auricles; veins 10 pairs ascending 5 or 6 lower pairs anastomosing. Sori median on all the veins. Indusium elongate hairy. *Hab.* Forests, Pahang, Telom (Ridley). Selangor, Rawang and Semangkok Pass (Ridley). Negri Sembilan, Gunong Angsi (Nur). Perak, Sungei Rayah and Larut (Kunstler and Scortechini).

Beddome says this is a *Mesochlaena* if the genus is kept up.

## 49. **Aspidium** Sw.

Fronds entire or simply pinnate; pinnae usually broad, lowest pair simetimes bipinnate, veins compoundly anastomosing with generally free veinlets in the areoles. Sori at the apex of the free

veinlets, occasionally on the netted veins. Indusium orbicular or reniform or irregular, sometimes absent. Species numerous. Tropics.

(1). ***A. singaporianum*** Wall. Cat. 374. Rhizome creeping, shortly or not. Stipes 6 to 12 in. long dark purplish. Fronds entire, lanceolate acuminate long narrowed to base and decurrent someway down the stipe, herbaceous 12 in. long or more, 2.5 to 4 in. wide; veins horizontal united by transverse secondary veins; veinlets netted with ultimate ones free. Sori numerous on the ends of the free veinlets 4 to 6 on each side of a main vein. Indusium peltate or orbicular. *Hab.* Common in jungle, Singapore, Bukit Timah; Chua Chu Kang. Pahang, Tahan River. Malacca, Jasin; Sungei Hudang (Derry) Mount Ophir (Cuming). Negri Sembilan, Bukit Sulu and Gunong Berumbun (Cantley). Selangor, Sungei Bulu; Rantau Panjang (Kloss); Kwala Lumpur (Curtis); Bukit Kudah. Perak, Thaiping (Scortechini); Chankat Serdang (Wray); Ipoh. Tringganu, Bundi (Rostados). Penang (Mactier etc). *Distrib.* Malay isles *Native names*: Paku Todak; Paku Biawak; Paku Murak.

(2). ***A. vastum*** Bl. Enum. Pl. Jav. Fil. 142. Rhizome creeping shortly. Stipes scattered conspicuously green winged nearly or quite to the base with numerous linear subulate brown scales. Fronds 2 ft. long cut down into about 4 pairs of broad oblong acute pinnae 7 or 8 in. long, 3 in. wide to a green winged rachis 1.5 to 2 in. or more, midrib pubescent, terminal pinna often over 9 in. long. and 5 in. wide ovate lanceolate, main veins numerous distinct to the edge where they anastomose, with numerous slender curved veinlets connecting them and abundance of areoles with free veinlets in them. Sori small scattered on the netted veins. Indusium reniform. *Hab.* Dense forests, Singapore (Norris). Pulau Besar. Johor, Batu Pahat (Ridley). Pahang, Tembeling River. Malacca (Griffith). Selangor, Batu Tiga; Batu Caves. Perak, Kota Bharu (Kunstler). Penang (Bishop Hose).

var. ***tricuspe*** *A. tricuspe* Bedd. Handbook Supp. 44. Frond trilobed and rather more pubescent than usual. *Hab.* Perak, Goping (Kunstler).

Apparently only a small state of *vastum*. *Distrib.* India, Malay islands.

This fern is very distinct in its broad winged rachis and petiole. The pinnae in the fertile frond are conspicuously narrower than in the sterile ones. Some fronds are quite glabrous, others pubescent on the midrib and lamina beneath.

(3). ***A. Kunstleri*** Bedd. Handbook Supp. 44. Three feet tall. Stipes, rachis and partial rachis pubescent; stipe ribbed, over 12 in. tall. Frond 12 in. to 16 in. long deltoid ovate, pinnate, upper pinnae lanceolate caudate-acuminate 5 in. long, 1 in wide, lowest pair broad deltoid, the lower margin prolonged into long-

linear acuminate lobes 4 in. long, .75 in. wide or less, texture subcoriaceous; veins primary zigzag or in lower pinnae straight, quite to the margin or forked at tip. Areoles lax, free, veins few. Sori small numerous usually on connected veinlets scattered. *Hab.* Perak (Scortechini); Goping (Kunstler).

(4). ***A. repandum*** Willd. Sp. v. 216. Stipes up to 2.5 ft. long with a few scale-like hairs at the base. Fronds 2 to 3 feet long subcoriaceous, terminal lobe pinnatifid; pinnae 4 to 8 on a side, 6 to 12 in. long, 1.25 to 2 in. broad linear-oblong, slightly sinuate at edges, acuminate, base narrowed, lowest pair stalked bipartite; main nerves distinct to the edge. Areoles numerous with free veinlets. Sori large in 2 rows between the main veins. Indusium orbicular peltate. *Hab.* Perak, Larut (Kunstler). *Distrib.* Philippines.

Resembles A.*pachyphyllum*, but the indusia are peltate.

(5). ***A. ternatum*** Diels in Engl. and Prantl, Pflanzen Familien 184. *Nephrodium ternatum* Bak. Hook. Syn. Fil. 296. Rhizome wide, creeping scaly. Stipes long slender, naked, 18 in. long. Frond of 1 to 4 pinnae broadly elliptic-lanceolate acuminate-caudate, base cuneate, lobes quite entire terminal one 9 in. long, 3 in. wide, the lower ones the smaller 6 in. long, 2 in. wide, herbaceous; veins ascending free to edge numerous. Areoles lax, free veinlets numerous. Sori medium or rather small on tips of free veinlets. *Hab.* Pahang, Pekan (Ridley). *Distrib.* Borneo.

(6). ***A. polymorphum*** Wall. Cat. 382. Rhizome erect. Stipes tufted with rather long, brown lanceolate scales at the base 8 to 18 in. long, ribbed. Frond nearly subcoriaceous, simply pinnate, 1 to 4 ft. long, 12 in. or more wide; pinnae oblong or elliptic or lanceolate acuminate, base cuneate stalked, terminal one rather larger and occasionally lobed, lowest pair usually bifurcate, 6 in. long, 1 to 2 in. wide, veins prominent distinct to the margin, veinlets very many, many free. Sori small and scattered in the uncontracted fronds on the netted veinlets, and on free ones in contracted fronds in 2 or more rows larger and crowded between the veins. Indusium reniform or none. *Hab.* Forests, Singapore (Ridley). Negri Sembilan (Hullett); Bukit Sulu (Cantley). Selangor, Kwala Lumpur; Rantau Panjang (Kloss). Perak, Larut (Kunstler); Ulu Temengoh (Ridley); Batang Padang and Goping (Kunstler). Penang, Hill (Pinwill). *Distrib.* India, Africa, Malaya. *Native Name*: Paku Kikir.

(7). ***A. semibipinnatum*** Wall. Cat. 388. (*Polypodium*) Hook. Sp. Fil. iv. 59. t. 231. Stipes 12 in. or more long, naked. Fronds 18 in. or more long, 6 to 9 in. wide, terminal pinna linear-oblong acuminate 6 to 9 in. long, 1 in. wide entire, lateral pinnae 4 to 6 on each side, simple or bifurcating, about as long and wide, lower ones tripartite, texture herbaceous; veins inconspicuous, breaking up before reaching the margin, the rest anastomosing,

a few free. Sori small on connected veinlets. Indusium reniform. *Hab.* Tidal mud in rivers. Johor, Castlewood; Gunong Pulai (Hullett). Muar, Sungei Segal (Fox). Perak (Scortechini). Penang (Wallich). *Distrib.* Borneo.

(8). ***A. subtriphyllum*** Hook. Sp. Fil. iv. 52. Caudex stout with thick stipe bases. Stipes 8 to 12 in. long, rather stout, linear scales at base only. Frond 1 to 3 feet long, 8 to 12 in. wide, herbaceous, deltoid, terminal portion 6 in. or more long, deeply pinnatifid; lower lobes lanceolate acuminate; base cuneate, lateral pinnae one pair lanceolate deeply lobed, basal larger deeply lobed with a deflexed pinna from underside, glabrous (hairy beneath and on main veins according to Beddome), veins very prominent irregularly broken up before reaching the edge, veinlets copiously anastomosing elevate. Sori large, few scattered on the connected veinlets. Indusium reniform. *Hab.* Limestone Hills in dry spots. Perak, Goping (Kunstler); Tambun (Ridley).

(9). ***A. decurrens*** Presl. Rel. Haenk. 28. Rhizome creeping. Stipes winged half way down or nearly to the base, with linear-subulate brown scales, 8 in. long. Fronds 3 feet long, simply pinnate sub-coriaceous, rachis broad-winged; pinnae few broad in sterile fronds, often 3 or more pairs and narrow in the fertile ones, 3 in. long, 1 in. wide or less, the lowest pair sometimes lobed, all entire or in fertile crenate, glabrous; main veins straight or zigzag to edge, cross veins forming large areoles with free and netted veinlets. Sori large in two series between the main veins and along the winged rachis. Indusium reniform, elongate or irregular. *Hab.* Forests Pahang, Telom. Perak, Bujong Malacca (Ridley). Tringganu, Bundi (Rostados). *Distrib.* Indo--Malaya, China, Polynesia.

Easily distinguished by its winged rachis decurrent half way down on the stipe.

(10). ***A. variolosum*** Wall. Cat. 379. Rhizome sub-erect. Stipes tufted, rather slender, scaly at base, 12 to 18 in. long in fertile frond, shorter in sterile fronds, deltoid herbaceous. Sterile fronds, apex deltoid pinnatifid; pinnae lower two pairs lanceolate acuminate, entire or lobulate crenulate, 3 in. long, 1.25 to 1.5 in. wide, lowest pair more or less deeply lobed with one large lobe at lower edge. Fertile fronds 6 in. long; pinnae much narrower, sometimes 2 in. long, .25 in. wide and deeply round lobed; main veins distinct to edge, veinlets copiously anastomosing with free veinlets. Sori large scattered on the tips of free veinlets, sunk in frond, and forming round elevations above. Indusium peltate or reniform. *Hab.* Dry woods. Penang (Wallich, Curtis). Perlis, Tebing Tinggi (Ridley). *Distrib.* India, Assam.

(11). ***A. cicutarium*** Sw. in Mett. Farngatt. Pheg. and Asp. 117. *A. coadunatum* Wall. Cat 377. Big tufted fern. Stipes 12 in. or more long, stout with brown scales half way. Fronds usually

large from 8 in. to 2 or 3 ft. long deltoid, tip pinnatifid; pinnae below, one to 4 pairs simply lobed or pinnate, secondary pinnae deeply pinnatifid or again pinnate, lowest pair deeply pinnatifid or pinnate on lower edge, thin, membranous, glabrous or hairy above and puberulous on midribs, veins free to margins, the others copiously reticulate, free veinlets few. Sori large in 2 rows on the free veinlets. Indusium reniform or peltate. *Hab.* Common in forests, Singapore Bukit Timah; Pulu Ubin. Johor, Batu Pahat. Malacca, Sungei Hudang. Negri Sembilan, Bukit Payong and Bukit Danan (Cantley). Selangor, Batu Caves. Perak, Ulu Temengoh. Kelantan, Kwala Relai (Haniff). *Distrib.* Tropics. *Native names*: Paku Larat; Paku Segala; Paku Tembaga.

The most cut up of any of our species when full grown.

(12). ***A. multicaudatum*** Wall. Cat. 377. Beddome, Ferns of British India 222. Rhizome erect covered with long blackish brown hairs. Stipe stout covered with long acuminate setaceous scales, most abundant at base, 12 in. tall. Frond 3 to 4 ft. long, terminal pinna large over 6 in. long, deeply broadly pinnatifid, lobes acuminate lanceolate, lower pinnae broad, lanceolate, deeply broadly lobed, bases broad decurrent, lowest pair deltoid, 12 in. long and nearly as broad, main veins distinct to edge. Sori large on the free veinlets. *Hab.* Forests, scarce, Perak, Thaiping Hills (Kunstler). *Distrib.* India, Burma.

(13). ***A. pachyphyllum*** Kuntze Bot. Zeit. 1848, p. 259. Stipe 12 in. long naked. Fronds 2 to 3 feet long, 1 to 2.75 ft. broad, subcoriaceous terminal pinna oblong lanceolate entire or sinuate 6 to 12 in. long, .75 to 2 in. wide, lower ones entire, or sinuate obscurely lobed, broadly lanceolate, long caudate acuminate, 9 to over 12 in. long, 2 to 2.5 in. wide narrowed at the base, lowest forked with 2 to 3 unequal lobes 8 or 9 in. long, veins straight to the edge, areoles numerous fine with many free included veinlets. Sori large in two regular rows. Indusium reniform. *Hab.* Forests. Pahang, Fraser Hill (Burkill). Selangor, Klang Gates (Ridley). Perak, Thaiping Hills (Kunstler, Scortechini); Sira Rimau (Yapp.) *Distrib.* Malaya, Polynesia.

Beddome says, perhaps a form of *repandum* with reniform indusia.

(14). ***A. amplifolium*** v. A. v. R. Bull. Buitenz. 1913. xi 2. Stipe long, glossy brown, fibrillo-pilose. Fronds ovate, herbaceous acuminate pinnate, terminal pinna ovate acuminate deeply pinnate at base, lowest segments falcate acuminate, bluntly lobed, lower pinnae about 4 on a side falcate acuminate, lowest the largest, deeply pinnatifid, pinnate at base. Rachis, midrib and veins more or less densely pubescent above, fibrilloso-pilose or glabrescent beneath. Free veinlets copious. Sori relatively large on anastomosing veins in one row on each side of veins or 2 short rows between the main veins. Indusium persistent. *Hab.* Perak, Goping (Matthew.)

(15). ***A. ternifolium*** v. A. v. R. Bull. Buitenz. 1913, xi. 3. Near *A. trifolium* v. A. v. R. but fronds with leaflets less different in size, veins not dark brown, fertile fronds more or less contracted. Sori compital (on anastomosing veins). Indusia deeply fimbriate. *Hab.* Perak, Goping (Matthew.)

I have not seen this.

## POLYPODIEAE.

### 50. **Polypodium** Linn.

Small ferns usually epiphytic and subcoriaceous. Fronds entire or simply pinnatifid (rarely pinnate or compound) veins all free. Sori round generally terminal on the veinlets, no indusium. *Distrib.* Whole World.

**Fronds simple, entire.**

(1). ***P. subevenosum*** Bak. Hook. Syn. Fil. p. 329. Small tufted fern 2 to 4 in. tall. Stipes very short, black wiry. Fronds coriaceous 2 to 4 in. long, .12 in. wide, ligulate entire, tip blunt gradually narrowed to the base, slightly scurfy beneath, edge slightly undulate. Veins very short indistinct. Sori round in a long row on each side of the midrib. *Hab.* On trees, in mountain districts, common. Johor, Gunong Pulai; Gunong Pantai. Malacca, Mount Ophir (Ridley). Pahang, Tahan River, Sungei Bau. Perak (Scortechini); Penang (Mactier and all collectors).

var. ***sessilifolium*** Christensen, *P. malaicum* Rosenberg l.c. 377. Caudex small, erect; stipes hardly any. Fronds membranous 3 to 9 in. long, .2 to .3 in. wide, linear hardly narrowed at the base, veins oblique forked. Sori oblong, parallel with the midrib, medial on the upper veinlet. *Hab.* Johor, Gunong Belumut (Holttum). Malacca, Mount Ophir (Hullett, Maingay). Penang.

(2). ***P. diplosorum*** Christ, Ann. Btz. xv. 146. Rhizome short, covered with black scales. Stipes tufted, light brown with long stiff hairs, .25 in. long. Fronds ligulate blunt slightly narrowed to tip, long acuminate at base, subcoriaceous sprinkled with stiff pale hairs, edge undulate 3 to 5 in. long, .25 in. wide, veins ascending pinnate; veinlets 3 or 4, the lowest forked. Sori rounded elliptic sunk in a row on each side of the midrib. *Hab.* Pahang, Gunong Tahan (Ridley 15976). *Distrib.* Java, Borneo, Celebes.

(3). ***P. hirtellum*** Bl. En. Fil. Jav. p. 123. Caudex small ascending. Stipes tufted .5 to 1.5 in. long slender, villous with spreading red brown hairs. Fronds firm-membranous, linear-oblong to lanceolate, 1 to 4 in. long .12 to .3 in. wide entire, base narrowed, densely villous with red hairs, veins spreading simple or forked at base. Sori round, rather distant in a row inside of midrib, on the base of simple veins, and on the tip of the short fork when branched. *Hab.* Mountains on trees and shrubs at 4000 to 5000 feet alt. Malacca, Mount Ophir, Pahang, Gunong

Tahan (Haniff). Perak (Scortechini); Tea Gardens, Thaiping Hills; Gunong Brumber Pahang (Wray); Gunong Inas (Yapp). *Distrib.* Ceylon, Java, Philippines.

(4). ***P. universe*** Bak. Ann. Bot. v. 464. A small densely tufted plant about 2 in. tall. Fronds very stiff, coriaceous narrow linear sessile 1.5 to 2 in. long, .08 to .12 in. wide, gradually narrowed to the base, with a few brown hairs, veins invisible. Sori oblong crowded in one row on each side of the midrib in the upper part of the frond covering the whole surface. *Hab.* On trees or rocks in stream at 2 to 3000 ft. alt. Pahang, Wray's Camp, Gunong Tahan (Ridley). Penang (Mactier, Curtis, Matthew); Richmond Pool.

I believe the plant named *P. Ridleyi* Christ, in my list of ferns from Gunong Pulai, Johor, was a small form of this.

(5). ***P. congenerum*** Presl. Tent. 180. Rhizome rather thick creeping with reddish scales. Stipes crowded wiry, red hairy .2 to 1 in. long. Frond linear acuminate long narrowed to base entire, thinly coriaceous sprinkled with blackish hairs beneath, more hairy on edge and midrib 6 in. long, .2 in. wide. Sori rather large, oblong in depressions on both sides of midrib. *Hab.* Mountains, Perak, Thaiping Hills Gunong Hijau 4500 ft. (Matthew.) *Distrib.* Borneo, Sumatra.

**Fronds small narrow, shortly lobed.**

(6). ***P. cucullatum*** Nees. and Bl. Nova Acta 11 (1823) 121, t. 12. fig. 3. Caudex very small, erect, covered with red acuminate scales. Stipes very short, naked. Fronds subcoriaceous linear 3 to 5 in. long, .1 in. wide or less, lobes linear-oblong blunt, cut almost or quite to rachis. Sorus solitary large, partly enclosed in the upcurved edge of the lobe. *Hab.* Mountains 4 to 5000 ft. alt. Pahang, Gunong Tahan (Ridley 15975). Malacca, Top of Gunong Mering (Ridley). Perak, Gunong Hijau (Scortechini); Maxwell's Hill (Matthew). *Distrib.* Ceylon, Malay islands.

(7). ***P. cornigerum*** Bak. Syn. Fil. 508. Fronds coriaceous tufted, subsessile, very narrow ligulate 6 in. long .1 in. wide, pinnatifid. lobed to base or nearly, lobes 20 to 30 pairs, longest in the middle, subtriangular subacute, slightly toothed on the upper edge or with a strong tooth, veins 1 to each lobe, short of the tip forked. Sorus solitary large, round, close to main rachis and medial on the vein. *Hab.* Rare; on mountains, Pahang, Gunong Tahan (Haniff). Perak, Gunong Hijau (Scortechini). *Distrib.* Ceylon.

(8). ***P. subpinnatifidum*** Bl. Enum. 129. Caudex erect, stiff. Fronds stiffly coriaceous linear narrowed to both ends, 4 to 6 in. long, .1 in. wide, cut down into very short blunt lobes halfway or little more, upper edge shorter than lower one. Veins forked. Sori large globose, slightly sunk near the rachis and upper margin

of the lobe. *Hab.* Mountains, Pahang, Gunong Tahan. Selangor, Semangkok Pass (Ridley). Perak (Scortechini); Gunong (De Morgan).

(9). ***P. triangulare*** Scortechini. Bedd. Journ. Bot. 1887. p. 324, fig. 278, i. Rhizome erect, short, scaly. Fronds sessile linear coriaceous 12 in. long, .25 in. wide, lobes triangular blunt, cut to rachis, reduced a little at base, fertile ones acute, very numerous. Sorus oblong on tip of lobe, sunk deeply, the sides of the lobe folded over it. *Hab.* Mountains local at 5500 ft. Perak, Gunong Hijau (Scortechini).

(10). ***P. callophyllum*** Wright Kew Bulletin 1909, 362. Small plant 3 in. tall, stem very short, hairy. Fronds thin, .2 in. wide, pinnate, white hairy, lobes oblong, tip round, bases decurrent. Sori usually 2 on a lobe, one at the base, the other near the middle. *Hab.* Rocks on Mountains. Perak, Thaiping Hills, Gunong Hijau (C. J. Matthew).

Near *P. trichomanoides,* Sw. but with paired sori.

(11). ***P. streptophyllum*** Bak. Journ. Bot. 1879, p. 42. Densely tufted, caudex erect red scaly. Fronds lobed to the base, thinly coriaceous pinnate, linear 3 to 8 in. long, .12 in. wide, lobes oblong blunt, very numerous, slightly twisted especially in fruit. Sorus one on the tip superficial oblong. *Hab.* Trees. Singapore, mangrove swamps at Serangoon (Murton). Pahang, Wray's Camp 2000 ft. Tahan; Telom. Malacca Mount Ophir. Selangor, Bukit Kutu. Perak, Gunong Inas (Yapp); Gunong Hijau (Matthew). *Distrib.* Borneo.

Very like *P. cucullatum* but pinnate with terminal sori.

(12). ***P. alternidens*** Ces. Fel. di Born. 25, T. ii, fig. 4-4a. Small densely tufted fern. Fronds densely crowded 1.5 to 4 in. long, .1 in. wide, very coriaceous, rachis winged, lobes very short, ovate oblong truncate, lower edge longer than the upper decurrent. Sori round solitary at the base of the lobe often covering it. *Hab.* Mountains. Malacca. Mount Ophir. Pahang, Gunong Tahan at 5000 ft. alt. Perak, Tea gardens, Thaiping Hills (Ridley). *Distrib.* Borneo.

The stiff thick fronds with very short ascending blunt lobes are very distinct.

**Fronds pinnate, with narrow deep cut lobes.**

(13). ***P. decorum*** Brack. Expl. Exped. xvi. 7, t. 2, fig. 2. Caudex about 1 in. long, densely covered with red scales. Stipes crowded, winged to the base. Frond coriaceous glabrous 6 to 12 in. long, .5 to .75 in. wide, narrow lanceolate, caudate-acuminate pinnatifid almost to the rachis, lobes at base short rounded above oblong linear blunt, longest in the middle of the frond and getting rapidly shorter to the ends. Sori oblong, 2 to 8 in a row on each side of the costule partly sunk in a hairy cavity, edge not

raised. *Hab.* Common on trees especially in mangroves and on tops of mountains. Singapore, Kranji. Johore, Gunong Pantai and Gunong Pulai (Ridley); Gunong Belumut (Holttum); Tanjong Bunga, Malacca. Mount Ophir and Mering. Negri Sembilan, Gunong Angsi (Holttum). Perak, Gunong Keledang (Ridley). Penang Hill, Kedah peak. *Distrib.* Indo-Malaya, Polynesia.

(14). ***P. malaccanum*** Bak. Ann. Bot. vii. 129. Densely tufted plant, stem scaly hairy. Stipes numerous, crowded, black, wiry hairy, 1 in. long. Frond 6 in. long, .25 in. wide, linear acuminate pinnate, lobes cut to base, longest in the middle, very hairy as in rachis, linear-oblong blunt. Sori 4 to 6 on each side, round, crowded at tip of lobe, not sunk. *Hab.* Mountains. Malacca, Gunong Mering (Ridley).

var. *pahangense* Ridl. Fronds 5 in. long, .25 in. wide, lobes much shorter, blunt, fringed with long hairs. Sori 1 to 3 on each side extending whole length of lobes. *Hab.* Pahang, Gunong Tahan (Ridley).

(15). ***P. bryophyllum*** van Alderwerelt van Rosenberg, Bull. Buitenz. 1914, xvi 35. Stipes tufted, capillary or filiform with minute scattered whitish or brownish narrowly clavate glands. Fronds linear 1 to 2 in. long, .1 to .15 in. wide, thinly coriaceous, veins simple, lobes oblong, broad, blunt rounded or more or less obliquely truncate retuse. Sori solitary. *Hab.* Penang (Matthew). I have not seen this.

(16). ***P. fuscatum*** Bl. Enum. 129. *P. mollicomum* Nees and Bl. Nova Acta ii. 121, t. 12, fig. 2. Stipes tufted, 1 to 3 in. long densely softly hairy. Fronds 3 to 6 in. long, .5 to 1 in. wide cut nearly to the rachis into close lobes, lobes .1 in. wide or less, linear blunt parallel sparsely hairy on the edge, rachis hairy veinlets simple. Sori 6 or 7 in a row rather large circular and entirely covering the lobes except at the base. *Hab.* On trees at 4000 ft. alt. Pahang, Fraser Hill (Burkill and Holttum). Perak, (Scortechini); Gunong Bubu (Wray). Kedah Peak (Ridley.)

(17). ***P. nutans*** Bl. Fil. Jav. 188. Rhizome short creeping, thick covered with red scales. Stipes tufted 2 in. long, very hairy. Fronds 5 to 14 in. long, 1 in. wide, black hairy especially densely on the strong rachis, lobes narrow, horizontal, parallel linear blunt cut to rachis. Sori not sunk, round 10 in a row on each side. *Hab.* Mountains to 6000 feet, on trees. Malacca, Mount Ophir (Moore's Herbarium) Perak, Gunong Kerbau (Robinson); Gunong Inas (Yapp, Scortechini).

(18). ***P. cryptosorum*** Christ. Ind. Fil. 519. *P. decipiens* Kuhn Linn. 36, 129. Rhizome short, densely covered with lanceolate subulate ciliate blackish scales. Stipes winged with long reddish hairs .5 in. long. Fronds coriaceous 8 to 14 in. long, .75 in. wide linear lanceolate narrowed at both ends, cut down nearly

to the midrib into lanceolate or linear lobes .2 to .25 in. long, beneath hairy veins flexuous, veinlets in 5 to 14 pairs. Sori submarginal, deeply sunk in elliptic cavities 6 to 8 pairs. *Hab.* Negri Sembilan, Gunong Angsi at 2500 ft. alt. (Nur). *Distrib.* Malay islands.

(19). ***P. khasyanum*** Hook. Syn. Fil. 325. Tufted plant, stem short. Stipes crowded, very short, winged to base, fronds 8 to 14 in. tall, 1.5 in. wide or less, flaccid, hairy, midrib stout hairy, lobes oblong linear blunt, rather thick, shortened to both ends; veinlets simple. Sori 4 to 6 on each side of the end of the lobe, sunk in an oval cavity. *Hab.* Mountains, rare, Johor, Gunong Pulai (Hullett). Perak, Maxwell's Hill (Matthew, Scortechini). *Distrib.* Assam, Khasya.

(20). ***P. barathrophyllum*** Bak. Journ. Bot. 1891, p. 107. Stem short erect stout covered with red long acuminate scales. Fronds lobed nearly or quite to base, 12 to 18 in. long, 1.25 in. wide, subcoriaceous, lobes triangular lanceolate subacute, .2 in. wide, free nearly to base decurrent on rachis, lowest ones shorter, ovate triangular at base. Sori 4 or 5 in a row, parallel to edges sunk round. Veins invisible. *Hab.* Perak (Bishop Hose). *Distrib.* Borneo.

(21). ***P. subfalcatum*** Bl. Fil. Jav. 186, t. 87. Rhizome erect, stipes densely tufted, clothed with soft spreading hairs. Fronds 2 to 10 in. long, .5 to 1 in. wide, pinnate, lobes hairy on both sides, soft in texture, cut down to rachis, close spreading, sharply toothed, base decurrent. Veinlets simple. Sori round 4 or 5 in a row, one to each tooth on the end of the veinlet. *Hab.* Perak (Scortechini, Day). *Distrib.* India.

(22). ***P. setuliferum*** van Alderwerelt van Rosemberg, Bull. Buitenz. 1914, xvi. 33. Rhizome short clothed with pale brown lanceolate scales. Stipes crowded, filiform setulose with short red hairs. Fronds linear hairy subcoriaceous 1 to 3 in. long, .12 to .2 in. wide, tip somewhat narrowed, lobes oblique narrowest nearly triangular and blunt or rounded, broadest subtrapeziform or subrhomboid, truncate emarginate veins solitary, forked in broadest lobes. Sori solitary at the base of the anterior veinlets. *Hab.* Malacca (fide author). Perak, Gunong Hijau 4500 ft. (Matthew). *Distrib.* Sumatra.

(23). ***P. stenobasis*** Bak. Ann. Bot. viii. 130. Tufted plant with short erect stem covered with scales. Stipes winged to base. Fronds 5 to 10 in. long, 1.5 in. wide, lobed nearly to base, thin coriaceous, lobes linear from a broad base, narrow acuminate distant parallel serrulate, undulate, rachis hairy. Sori 3 to 7 on a side close to the edge by the notches, small, round sunk with raised edges, sterile lobes entire, lowest ones short, triangular blunt on stipes. *Hab.* Mountains; rare. Perak, foot of Gunong Bubu (Matthew). *Distrib.* Sumatra.

(24). ***P. brevifrons*** Scort. ms. *P. repandulum* Mett. var. *malayanum* Bedd. Journ. Bot. xxxi 225. Tufted fern 4 or 5 in. tall, stem short erect, not scaly. Stipes slender, winged, .25 in. long. Frond 3 to 5 in. long, .75 in. wide, lobes cut nearly to base, linear blunt narrow entire or undulate. Sori solitary, 4 in a row along the edge, round deeply sunk in pits with raised margins. *Hab.* Perak (Scortechini).

Very close to *P. repandulum* Mett. of Ceylon only differing in the fact that the sori are deeply sunk with raised margins instead of being in shallow depressions. I have not seen it.

(25). ***P. obliquatum*** Bl. Enum. 128. Tufted fern 12 in. tall. Stems .5 in. long covered with scales. Stipes hairy, 1.5 to 2 in. long. Fronds 8 in. or more long, .75 to 2 in. wide pinnate; rachis hispid or glabrous, lobes narrow linear acuminate cut to rachis, base dilate subcoriaceous; veinlets simple not reaching the margin. Sori 4 to 6 on each side linear-oblong sunk in a cavity with strongly elevate edges, apical on veinlet, medial and pointing upwards. *Hab.* Mountains. Pahang, Telom Cascade (Ridley); below Fraser Hill (Holttum). Perak, Maxwell's Hill (Scortechini); Gunong Hijau (Wray). *Distrib.* India, Ceylon.

(26). ***P. papillosum*** Bl. Enum. 131. Rhizome long slender, creeping. Stipes 1 in. apart, 1.5 to 6 in. long, slender, glabrous. Fronds 12 in. or more long, 2 in. wide, pinnate, lobes linear obtuse, horizontal parallel, 1 in. long, .1 in. wide, sub-herbaceous, entire or faintly crenate, glabrous, veins black once forked. Sori 7 or 8 in each row sunk on the ends of the upper fork, small circular, more than half way from the rachilla. *Hab.* Rocks up to 1000 feet alt. Perak, Kinta; limestone rocks (Kunstler); Gunong Arang Parah (Scortechini); Thaiping Hills (Kunstler); Gunong Kerbau (com. Ridley). Kelantan, Kwala Limau Nipis (Nur.).

**Fronds bipinnate, lobes very narrow.**

(27). ***P. tenuisectum*** Bl. Fl. Jav. ii. t. lxxxvii. Rhizome short creeping densely clothed with lanceolate scales. Stipes crowded, hairy, 2 in. long. Fronds lanceolate, 9 in. long, 2 in. wide bipinnate; pinnae free to base, linear numerous, cut to base into short linear lobes, .05 in. long, coriaceous; rachis hairy. Sori large round at the base of each lobe in terminal part of frond. *Hab.* Mountains, rare. Perak (Scortechini); Gunong Hijau (Matthew). *Distrib.* Java, Philippines, Polynesia.

## 51. **Prosaptia** Presl.

Tufted short creeping ferns. Fronds linear-lanceolate pectinate or pinnatifid coriaceous; nerves simple free. Indusium a marginal subcylindric cup, formed of the substance of the frond. Species about 8. Tropical Asia. Formerly placed under *Davallieae*.

(1). ***P. contigua*** Presl. Tent. 166. Fronds tufted, sessile, 12 to 18 in. long, 1 to 1.5 in. wide, linear-lanceolate cut down nearly or quite to rachis in narrow linear lobes. Sori 2 or 3 on lobes near tip of lobes. *Hab.* On trees. Pahang, Tahan river (Ridley 15977). Sungei Ujong (Hullett). Selangor, Ulu Gombak. Perak, Larut 3 to 3500 feet (Kunstler 2107); Gunong Inas (Yapp 407); Gunong Hijau (Scortechini 490); Gunong Kerbau (Robinson). *Distrib.* S. India, Ceylon, Malay isles to Papua. Polynesia.

(2). ***P. Emersoni*** Presl. Tent. 166. Dense tufted, fronds 8 in. long, 1 in. wide, sessile; lobes oblong, .75 in. wide cut more than half way to rachis. Sori round the edge of lobes. *Hab.* Common on trees and rocks on hills. Johor, Gunong Pulai (Hullett). Malacca, Batu Tiga (Derry). Selangor, Rawang, Bukit Hitam, Bukit Kutu (Ridley). Perak Hermitage Hill; Bujong Malacca (Ridley); Maxwell's Hill (Scortechini); Gunong Inas (Yapp 410); Gunong Kerbau (Robinson). Prov. Wellesley, Bukit Panchur (Ridley). Penang Hill (Ridley, Finlayson, Wallich 249, Maingay). Kedah Peak (Ridley 5170). *Distrib.* S. India, Ceylon, Sumatra, Java, Borneo, Philippines, Fiji.

## 52. **Goniophlebium** Presl.

Large ferns. Fronds wide simply pinnate or pinnatifid; pinnae articulate with rachis; rhizome creeping. Stipes distant, veins forming large ample areoles, each with a simple or forked free veinlet. Sori in two rows, on the ends of the free veinlet, globose rarely oblong, no indusium. Species about 20. Tropics.

(1). ***G. amoenum*** Sm. in Hook. Gen. t. 51. Rhizome elongate stout, covered with long acuminate subulate scales. Stipes distant 6 to 12 in. long, straw-colour or brown. Fronds 1 to 2 feet long, 6 to 10 in. wide, glabrous, ovate ending in a long acuminate undulate segment; lobes ensiform acuminate sub-falcate, horizontal, bases wide decurrent, 3 to 8 in. long, .25 to .3 in. wide, entire or more or less serrate, lower pair deflexed, veins inarching forming areoles with a free veinlet bearing a sorus, marginal veinlets free. Sori circular sunk, 10 or more in each row half way from costa. *Hab.* Mountains apparently rare. Selangor, Semangkok Pass (Ridley). *Distrib.* India.

(2). ***G. Prainii*** Bedd. Journ. Bot. xxxi. 1893, p. 226. Rhizome stout densely covered with dark brown hair-pointed scales with broad peltate bases. Stipes 15 to 24 in. tall stout glabrous. Fronds deltoid lanceolate, 12 in. long, 10 in. wide at base, lobes numerous .75 in. wide, narrow linear-lanceolate acuminate, base broad sessile (rachis not winged), glabrous except for a few scales and hairs on rachis, edges slightly crenulate, papyraceous, veins prominent on both sides; areoles in 2 series, with a free central veinlet bearing a sorus. Sori round not sunk, numerous. *Hab.* Perak (Scortechini).

(3). ***G. subauriculatum*** Bl. Fl. Jav. p. 177, t. 83. (*Polypodium*) Rhizome creeping stoloniferous, densely covered with narrow acuminate hair-pointed scales. Stipes 6 to 12 in. long, scaly red-brown. Fronds firm thinly sub-coriaceous, 2 to 6 feet long, 12 in. or more wide, pinnate, lobes horizontal distant, numerous, 3 to 10 in. long .3 in. wide, shortly petioled, jointed on the base, linear-lanceolate long acuminate, base cuneate, serrate, veins forming a double row of arches, each including a free veinlet, the lower one only soriferous, marginal veinlets free. Sori in one row on each side, very numerous, over 40 in a row, sunk below forming raised pustules above. *Hab.* On trees in mountain forest 2500 to 5000 feet alt. Perak, Thaiping Hills (Kunstler); Gunong Inas (Yapp). *Distrib.* Indo-Malaya, Australia.

(4). ***G. verrucosum*** Wall. Cat. 296 (*Polypodium*). Rhizome long creeping stout very paleaceous. Stipes 18 in. long and more. Fronds 2 to 7 feet long oblong acuminate membranous, lobes shortly petioled, numerous, distant, 3.5 to 8 in. long, .5 to .75 in. wide; sterile ones 1.4 in. wide, edge shortly crenulate-serrate, base cuneate, veins slender straight parallel, forming with the anastomosing veinlets 4 or 5 series of areoles, with a free excluded veinlet, only the lowest one soriferous. Sori round, close to the midrib, very numerous, sunk in a deep cavity pustulate on upper side. *Hab.* Common in low country, usually terrestrial, but occurring as an epiphyte. Singapore (Wallich); Pasir Panjang; Bukit Mandai (Ridley). Johor, Gunong Pulai (Hullett). Pahang, Fraser Hill (Burkill). Malacca (Hervey). Selangor, Dusun Tua; Batu Caves (Ridley). Perak. Thaiping Hills, to 1500 feet (Hervey); Sungei Raya (Kunstler). Penang (Wallich). Lankawi (Curtis). Kelantan, Kelumpor (Haniff). *Distrib.* Malay-isles.

(5). ***G. Korthalsi*** Mett. Fil ii. 223. Rhizome creeping slender 10 to 15 feet long, covered with small subulate ciliate scales. Stipes 5 to 6 in. long, glabrous. Fronds 1 to 2 feet long, 10 in. wide, lobes distant sessile or petioled, lanceolate long- caudate acuminate, base cuneate, crenate, often serrate at tip, 6 in. long, 1 in. wide, veinlets forming 3 or 4 areoles. Sori globose, round in 3 rows, very slightly sunk. *Hab.* Epiphytic, clinging to trees in thick clusters, wet swampy localities. Perak, Larut (Kunstler); Thaiping Hills, Cottage (Hervey). Penang Hill (Fox).

## 53. **Selliguea** Bory.

Rhizome creeping. Fronds simple or pinnatifid rarely pinnate articulated with rhizome; veins compound anastomosing with free included veinlets in the areoles. Sori long linear.

Resembles a *Pleopeltis* but for the linear sori and is reduced to this affinity by v. A. v. Rosenberg. Species 15 Tropical Asia.

(1). ***S. membranacea*** Hook. Syn. Fil. p. 388. Epiphyte. Rhizome long creeping, scales small linear-acuminate, brown. Stipes .5 to 1 in. apart, 5 to 8 in. long, moderately stout. Fronds membranous, lanceolate acuminate, long, narrowed to base, midrib prominent, 6 to 12 in. long, 1 to 2.25 in. wide. Veins very slender sinuous, branching near the edge. Areoles large hexagonal. Sori in separate masses in a line between the veins in the centre of the areoles. *Hab.* On the mossy stems of trees and shrubs in dense jungle, Perak, Ulu Kerling, and Kampar River (Kunstler). *Distrib.* Malay islands.

Given also from Singapore in Moore's Herbarium, but the locality is doubtful.

var. ***fluminalis*** Ridl. Rhizome long creeping, densely covered with roots, fronds narrow lanceolate, long-acuminate, and long narrowed to base, 6 in. long, .5 in. wide. Sori lines often short and broad. *Hab.* On rocks in streams. Lankawi, Foot of Gunong Raya (Curtis).

This is identified by Wright as *S. membranacea,* but it differs in habit and form of leaves from ordinary forms. There are specimens from Samar, Philippines (Cuming) something like it.

(2). ***S. Hamiltoniana*** Hook. Sp. Fil. v. 160. Rhizome woody. Scales dark brown linear, but very deciduous, most often rhizome bare. Stipes 1 in. apart, 1 to 14 in. long, stout. Fronds membranous, sterile ones large, broad, elliptic-oblong 4 to 14 in. long 2.5 to 5 in. wide, acuminate gradually tapering to the base and decurrent on the petiole; veins slender, .3 in. apart, distinct to edge with many areoles with free included veinlets; fertile fronds 4 to 8 in. long, 1.5 in. wide on longer stipes. Sori in broad rows, between the main veins almost covering the whole underside. *Hab.* Mountain forests. Perak (Scortechini); Maxwell's Hill 3 to 500 ft. alt. (Matthew); Goping (Kunstler). Kelantan Kwala Limau Nipis (Nur). *Distrib.* India, Yunnan.

(3). ***S. Feei*** Bory Dict. Class vi. 588. Rhizome rather slender, densely covered with brown subulate scales. Stipes rather slender .2 in. distant, 3 to 7.5 in. long. Fronds stiffly coriaceous ovate-lanceolate acute, base cuneate, sterile ones broader, more ovate 1.5 to 3 in. long, .75 to 1.5 in. wide, fertile ones much longer and narrower, 3 to 6 in. long, .75 to 2 in. wide, base usually long, narrowed. Veins prominent slender running nearly to edge. Sori in broad lines between the veins, not extending to edge or midrib. *Hab.* Epiphytic on trees, common, especially in mangroves, Singapore, Kranji. Johor, Gnong Pulai; Tempayan river (Ridley). Malacca, Batu Tiga (Derry). Pahang, Tahan River. Negri Sembilan, Gunong Angsi (Burkill). Perak, Thaiping Hills (Kunstler); Box Hill (Fox); Temengoh (Ridley); Sira Rimau (Yapp). Penang (Wallich). *Distrib.* Malay islands. *Native name*: Paku Galah Hantu Laut.

var. ***caudiformis*** J. Sm. Ferns British and Foreign, 97. Fertile forms much narrowed long acuminate, subcaudate. Sori large, round solitary between the main veins. *Hab.* Malacca (Maingay).

(4). ***S. subcaudiformis*** Ridl. *Pleopeltis subcaudiformis* v. A. v. Rosenberg, Malayan Ferns Suppl. i. p. 384. *Polypodium caudiforme* Chr. Farnkr. der Erde, 108 (not of Blume). Rhizome creeping, scales pale to dark brown, lanceolate crowded. Barren fronds coriaceous oblong-ovate or lanceolate narrowed at both ends, edge entire, slightly revolute, midrib prominent. Main nerves distinct not reaching the margin, 3 in. long, .75 in. wide. Stipes slender, pale 3 in. long. Fertile frond linear lanceolate, subcaudiform 6 in. long, .5 in. wide, base decurrent narrowed very gradually. Sori large sunk about 25 on each side, round or oblong solitary between the main veins. *Hab.* On a fallen tree, 4000 to 4370 feet. Pahang, Fraser Hill (Burkill and Holttum 8834). *Distrib.* Malay islands.

v. A. v. Rosenberg says it is united with *S. heterocarpa* by intermediates.

**Excluded species.**

*S. Maingayi* Bedd. Handbook. *Polypodium Maingayi* Diels, Nat. Pfl. fam. $1^4$,318. A mixture of several ferns, none of which are *Selligueas.*

*S. heterocarpa* Hook. Malacca v. A. v. R. Malayan Ferns 676 and *S. elliptica* Thunb. Malacca A. v. R. Malayan Ferns 677. No specimens from the peninsula seen or recorded.

## 54. **Pleopeltis** H. and B.

Epiphytic rock plants; rhizome creeping. Fronds simple, or lobed, coriaceous or membranous, veins copiously anastomosing with numerous irregular areoles with generally free included veinlets. Sori usually on the back of united veinlets. Species numerous, all Tropics.

**Stems hollow, full of ants.**

(1). ***P. sinuosa*** Bedd. i. t. viii. Epiphyte, rhizome thick, fleshy, tunnelled throughout and containing ants nests, roots few, scales orbicular peltate, papery, with a dark central boss studded with conical processes on which the stipes are articulated. Stipes 1 to 2 in. long, glabrous. Fronds fleshy, coriaceous, sterile ones lanceolate narrowed and blunt at tip, and long narrowed to base, 6 in. long 1.2 in. wide, fertile ones usually narrower and blunt, 6 to 18 in. long, 1 to 1.25 in. wide, obscurely sinuate on the edge. Veins copiously anastomosing forming large areoles. Sori large, oblong sunk in pits forming pustules on the upper surface in a single line near the edge or median. *Hab.* Lowland trees, common and covering the boughs in the south. Singapore, Tanglin;

Bukit Timah; Jurong. Johor, Gunong Pulai. Malacca (Griffith). Perak (Scortechini); Batu Kurau (Matthew). Penang (Mactier, Curtis). *Distrib.* Malay islands.

(2). ***P. lomarioides*** Moore Ind. lxxviii. Rhizome forming a large fleshy ant's nest, black, covered with small peltate scales, with broad scarious edges and red centres. Stipes distant rising from conical protuberances 2 in. long. Frond oblong pinnate, fleshy coriaceous, lobes usually numerous in sterile fronds 8 to 16 on a side broad blunt oblong, base decurrent on rachis 2 in. long 1 in. wide, fertile linear blunt 22 on each side, 2.5 in. long, .25 in wide. Sori large in one row on each side of the midrib. *Hab.* On the boughs of Dipterocarp trees, 180 feet high. Singapore, Bukit Timah (Matthew). *Distrib.* Borneo, Philippines.

**Rhizome slender, solid. Fronds simple.**

(3). ***P. peltata*** Scort. in v. A. v. Rosenberg Malayan Ferns, 632, *Polypodium peltatum* v. A. v. R. l.c. Epiphytic on trees and roots. Rhizome slender, long, covered with round brown papery scales with a raised dark centre (as in *sinuosa*). Stipes 3 in. or more apart, slender 4.5 in. long, articulate at base. Fronds broadly elliptic-lanceolate caudate, base long narrowed, membranous, 7 in. long, 1.75 in. wide. Veins very slender, not extending to margin, areoles large, irregular with several branched veins in each. Sori small, scattered in three rows in the middle of the frond not sunk. *Hab.* In forests in mountains 2000 to 5000 ft. alt. Pahang, Fraser Hill (Burkill). Perak, Thaiping Hills to Gunong Hijau (Kunstler, Bishop Hose, Matthew).

(4). ***P. Wrayi*** Bak. Ann. Bot. v. p. 473. Rhizome slender, covered with deciduous numerous red-brown lanceolate subulate scales. Stipes .1 to .5 in. apart, very slender, 1 to 2.5 in. long, glabrous. Sterile fronds oblanceolate to spathulate blunt, thinly coriaceous, base long narrowed, 1.25 to 2 in. long, .2 to .5 in. wide, black-dotted beneath. Fertile fronds linear, blunt narrowed to the base, blunt at tip, 3 to 6 in. long, .1 to .25 in. wide. Veins in both forms of fronds very inconspicuous. Sori medium size, in a row on each side of midrib. *Hab.* Mountains, Pahang, Kluang Terbang (Barnes); Gunong Tahan (Ridley); Fraser Hill (Burkill and Holttum). Perak, Thaiping Hills, Gunong Hijau (Wray); Cottage, Tea gardens (all collectors).

(5). ***P. accedens*** Bl. Enum. Fil. Jav. p. 121. Epiphytic with very slender filiform rhizome, covered with rather scanty lanceolate acuminate-caudate pale deciduous scales. Sterile fronds .5 to 1 in. apart, with very short stipes, subcoriaceous opaque oblong rounded at tip, 1. to 1.5 in. long, 1 in. wide, base narrowed; fertile fronds lanceolate long-acuminate blunt 3 in. long, .3 in. wide at base; venation obscure. Sori large on the acumen only, elliptic one row on each side of the midrib. *Hab.* Pahang, Sungei Me-

rapok (Nur). Negri Sembilan, Ulu Pedas (Burkill). Selangor, Semangkok Pass (Ridley). Perak, Bujong Malacca (Ridley); Thaiping Hills (Kunstler); Maxwell's Hill (Matthew); Temengoh (Ridley); Sira Rimau (Yapp). *Distrib.* Malaya, Polynesia.

(6). ***P. stenopteris*** Bak. Journ. Bot. xvii. 45. Rhizome long, slender covered with lanceolate acuminate reddish scales. Fronds .1 to .2 in. apart, coriaceous extremely narrow, decurrent into slender stipes 1.5 in. long, linear blunt, sterile ones 3 in. long, .05 in. wide; fertile ones 6 in. long, but no wider, involute channelled down upper surface, midrib prominent beneath, venation invisible. Sori large for the plant, oblong wider than the frond in one row on each side of the midrib but conjoined. *Hab.* Mountain, rare. Pahang, Gunong Tahan 5500 ft. alt. (Ridley 15973). *Distrib.* Borneo.

(7). ***P. stenophylla*** Bl. Fil. Jav. p. 135, t. 55, fig. 1. *P. Morgani* Zeiller Bull. de la Soc. Bot. de France, xxxii. 76. Rhizome moderately stout covered with reddish yellow lanceolate acuminate non deciduous scales. Stipes slender, .25 to 1 in. long, .25 to 2 in. apart. Fronds stiffly coriaceous. Sterile ones oblanceolate tip round, base narrow 2 to 3 in. long. Fertile fronds linear blunt, long, narrowed to base on rather stouter and longer stipes than the sterile ones, 3.5 to 7 in. long. .25 to .5 in. wide, veins except the stout midrib invisible. Sori in a single row along each edge, large elliptic or round, deeply sunk in a pit forming pustules on the back. *Hab.* On trees from lowlands to 4000 ft. alt. Singapore, Bukit Timah. Johor, Gunong Banang, Batu Pahat (Ridley). Malacca (Norris); Mount Ophir (Lobb). Pahang, Fraser Hill (Burkill and Holttum). Perak, Maxwell's Hill (Scortechini); Chankat Simpah; Kerbau river (Morgan); Gunong Inas (Yapp). Penang (Cantley). Kedah Peak (Ridley, Robinson). *Distrib.* Malaya.

(8). ***P. longifolia*** Bedd. Ferns Brit. Ind. i. t. 7. Rhizome thick, scaly. Stipes approximate 2 to 3 in. long. Fronds fleshy coriaceous 1 to 3 feet long, .75 to 1.25 in. wide linear-lanceolate blunt acuminate gradually long narrowed to base, edges revolute (when dry), venation very indistinct. Areoles large, broken up into smaller ones which include free veinlets. Sori large oblong numerous along the outer edge, sunk in pits elevate on upper surface. *Hab.* Common on trees. Singapore, Sungei Morai; Bukit Timah. Johor, Tebing Tinggi; Gunong Pulai (Hullett). Negri Sembilan, Perhentian Tinggi, Perak Larut (Kunstler); Waterloo (Curtis); Bujong Malacca; Temengoh (Ridley). *Distrib.* Indo-Malaya.

(9). ***P. platyphylla*** Bedd. Handbook. Suppl. 94. Rhizome stout, woody, covered with blackish brown lanceolate acuminate caudate scales. Stipes .5 to 1 in. apart, stout 2.75 to 8 in. long, with a tuft of scales at base. Fronds very stiff, lanceolate-oblong, blunt or subacute, base shortly narrowed, 9 to 14 in. long, 2 to 3

in. wide, midrib stout. Veins transverse strongly elevate beneath, very numerous parallel, venation invisible. Sori 9 in a row in the centre between the veins small, quite round glabrous. *Hab.* Mountains on rocks and trees, Selangor, Semangkok Pass and below Fraser Hill (Holttum). Perak, Maxwell's Hill (Matthew); Gunong Arang Parah (Scortechini). Kedah Peak and Yan (Ridley). *Distrib.* Java.

(10). ***P. rupestris*** Moore Ind. lxxviii. Epiphyte; rhizome slender long, covered with lanceolate acuminate brown scales. Stipes distant 7.5 in. long. Fronds stiffly coriaceous, sterile ones ovate to lanceolate acuminate, blunt, base usually round 6 in. long, 2.5 in. wide. Fertile ones usually more lanceolate and narrower; nerves conspicuous on both sides strongly elevate beneath, parallel numerous, areoles invisible. Sori in 2 rows on either side of the veins, 6 to 8 in each row, not sunk. *Hab.* Rocky mountains, Perak (Scortechini); Gunong Bubu (Kunstler); Gunong Inas (Yapp). Kedah, Gunong Bintang (Kloss). *Distrib.* Java.

(11). ***P. Scortechinii*** Bak. Ann. Bot. v. 477. Rhizome long, creeping. Stipes approximate 15 to 16 in. long, winged articulate. Fronds membranous lanceolate to oblanceolate long-narrowed to base, tip acute 9 to 36 in. long, 3 to 3.75 in. wide; nerves elevate on both sides, parallel continuous nearly to edge half an inch apart; areoles copious with free included veinlets inconspicuous. Sori minute scattered. *Hab.* Mountain forests; Negri Sembilan, Ulu Pedas (Burkill). Perak, Thaiping Hills (Kunstler Scortechini); Sira Rimau (Yapp).

(12). ***P. Zollingerianum*** Moore Ind. Filicum (1857) *Polypodium heterocarpum* Bl. Fl. Jav. ii. 167. t. lxxv. Rhizome rather stout, scales lanceolate flattened long acuminate scanty often nearly absent except at base of stipes. Stipes distant, stout 5 in. long, but winged for two thirds of their height. Frond membranous lanceolate long acuminate at both ends, margin crenate-undulate, 8 to 12 in. long, 1.25 to 2 in. wide (barren ones widest) veins conspicuous numerous, distinct to the edge; veinlets forming copious areoles with free veinlets. Sori small round or oblong often confluent in single rows between the veinlets. *Hab.* Mountain forests, rare. Perak, Temengoh (Ridley 14235). *Distrib.* Java, Philippines, Sumatra.

(13). ***P. viridis*** Moore Ind. Fil. *P. punctata* Bedd. F. B. I. 357. Rhizome short not creeping with numerous brown woolly roots. Fronds crowded, subsessile articulate thin, fleshy oblanceolate oblong elongate blunt, or subacute, base narrowed gradually; nerves inconspicuous. Main nerves not reaching the edge; areoles numerous. Sori small, very numerous scattered.

*Hab.* Common, on low trees and stumps. Singapore, Chan Chu Kang; Serangoon; Botanic Gardens. Malacca, Pulau Besar (Griffith). Selangor; Semangkok Pass. Perak, Thaiping (Scortechini). Penang (Kunstler); Pulau Badak (Curtis). Setul (Ridley). *Distrib.* Old world tropics.

(14). ***P. musaefolia*** Moore Ind. Fil. Rhizome stout, woody brown woolly and densely covered with brown woolly roots. Stipes articulate very short or practically none approximate. Fronds papery thin, 2 to 3 feet long, 4 in. wide, elongate oblong-lanceolate acute, base narrowed gradually or shortly often broad, midrib stout; nerves elevate beneath horizontal parallel, not running to edge. Areoles numerous large and broken up into smaller ones, with many free veinlets. Sori small, scattered. *Hab.* On rotten logs or epiphytic. Johor, Tanjong Kupang. Selangor, Ginting Bidai Caves. Perak, Sungei Rayah (Kunstler); Gunong Kerbau (Robinson); Sira Rimau (Yapp); Larut (Kunstler). *Distrib.* Malay islands.

(15). ***Pleopeltis*** sp. Rhizome slender covered with crowded lanceolate acuminate reddish scales. Fronds close together, coriaceous. Stipes 1.5 in. long, slender. Lamina 5 in. long, .3 in. wide, sterile ones slightly wider, lanceolate-linear, shortly narrowed to the blunt tip long and gradually narrowed to the stipes, margins minutely toothed, serrulate; nerves ascending prominent to the edge. Sori slightly immersed in 2 rows, rounded. *Hab.* Log over a stream at 4000 ft. alt. Pahang. Bukit Fraser (Eryl Smith 866). I have only seen one incomplete specimen of this fern, but I cannot match it with any described species.

**Fronds lobed or pinnatifid.**

(16). ***P. pteropus*** Moore Ind. Fil. *Polypodium pteropus* Bl. Fl. Jav. Fil. 168, t. 76. Rhizome creeping moderately thick, with brown lanceolate acuminate scales. Stipes 3 to 10 in. long, base sparsely hairy, upper part strongly winged. Fronds membranous, thin, simple lanceolate acuminate narrowed to base, 12 in. long 1.5 in. wide, or more commonly 3-lobed, lobes lanceolate long-caudate, central one the broadest, 9 in. long, 1.5 in. wide, lateral ones 1 in. wide; nerves slender, parallel not running to edge. Areoles inconspicuous rather large. Sori small scattered. *Hab.* In mud in jungle streams, Selangor, Batu Caves (Ridley, Matthew). Perak, Ulu Bubong (Kunstler); Ulu Temengoh (Ridley); Kinta river, (Kunstler). *Distrib.* India, Malay islands and China.

(17). ***P. hastata*** Moore Ind. 346. Rhizome creeping, stout covered with lanceolate acuminate subulate scales. Stipes 2 to 5 in. long, rather close set. Fronds coriaceous 12 in. long, 3 in. wide, deltoid, ovate acuminate trifid or deeply pinnatifid with 5 to 17 lobes cut within half an inch of the rachis, lobes lanceolate-acuminate, 4 in. long .75 in. wide; nerves numerous parallel

conspicuous running to edge. Areoles in 3 to 4 series broken up into smaller ones with free veinlets inconspicuous. Sori large, not sunk round near the central vein. *Hab.* Epiphyte in mountains. Perak, Gunong Inas, 4800 ft. alt. (Yapp).

(18). ***P. dilatata*** Bedd. Ferns Brit. Ind. t. 122. Rhizome stout creeping with ovate reticulate scales. Stipes stout winged the whole length or for over halfway by the decurrent base of frond, 1.5 ft. long. Fronds large, 2 to 3 feet long, 12 in. and more wide, membranous; rachis broadly winged, lobes cut to the rachis; 6 to 8 in. long, 1 to 1.5 in. wide, linear-oblong acuminate entire or serrulate at the tips, veins wavy forming large primary areoles broken up into smaller ones with many free veinlets. Sori numerous, very small, round or oval or scattered. *Hab.* Dense jungle on slopes of steep hills, Perak, Goping (Kunstler).

(19). ***P. incurvata*** Moore Gard. Chron. (1860) 1105. Epiphyte or rock plant. Rhizome long covered with pale brown oblong lanceolate papery scales. Stipes .5 to 2 in. apart, 4 to 9 in. long, stiff. Fronds sterile entire ovate, or 3-lobed, 6 in. long, lobes ovate-lanceolate, terminal one largest 4 in. long, 2.25 in. wide, fertile fronds of 3 to 7 stiff coriaceous linear lobes (rarely simple) cut to rachis, bases decurrent 6 in. long, .25 in. wide, distant, main nerves distinct, others invisible, areoles fine. Sori large, oval sunk into a deep pit, forming a circular tubercle on the upper side in one row between midrib and edge. *Hab.* Mountains, 4000 to 5000 ft. alt. Malacca, Mount Ophir (Griffith). Pahang, Gunong Tahan. Selangor, Bukit Hitam. Perak, Bujong Malacca (Ridley); Thaiping Hills, Birch's Hill (Wray); Cottage (Hervey); Gunong Inas (Yapp). Kedah Peak (Robinson). *Distrib.* Malay islands.

(20). ***P. laciniata*** Bedd. Handb. Supp. 97. *P. macrochasma* Bak. Journ. Bot. (1880), 216. Terrestrial or epiphytic. Rhizome rather stout densely covered with dark red brown lanceolate acuminate scales. Stipes long, distant, 6 to 12 in. long, shining, dark brown. Fronds glaucous coriaceous 8 to 18 in. long, cut down into 17 to 20 lobes nearly to the rachis, lobes linear acuminate, 4 to 6 in. long, .5 to 1 in. wide, veins prominent beneath, very numerous parallel running to the thickened edge; veinlets invisible. Sori round, sunk, a single row on each side of the midrib halfway between midrib and edge or nearer edge, elevate on upper side. *Hab.* Mountains 4000 to 5000 ft. alt., on trees or rocky ground. Pahang, Gunong Tahan; Fraser Hill (Holttum). Perak, Thaiping Hills, Caulfield's Hill (Kunstler, Day); Gunong Hijau (Wray). *Distrib.* Java.

(21). ***P. phymatodes*** Moore Ind. lxxviii. Epiphytic or rock plant. Rhizome long creeping, woody, glaucous with dark brown lanceolate caudate scales. Stipes 3 in. apart, 1.5 to 12 in. long stiff, smooth. Fronds coriaceous, entire elliptic lanceolate, 4.5 to 8 in. long, 1.5 to 2 in. wide, or deeply lobed, 12 to 24 in. long,

lobes 3 to 18 oblong acuminate, cut down to .2 to 1 in. towards the broad winged rachis, 3 to 4 in. long, .75 to 1 in. wide, midrib and costae of lobes prominent. No distinct main-nerves. Areoles fine, free veinlets numerous. Sori large, sunk in one or two rows or scattered. *Hab.* Common on trees, stumps or rocks, or wells in low country, Singapore, Gardens; Pasir Panjang; Changi; Pulau Ubin. Johor. Pahang, Kwala Pahang; Pekan. Malacca, Pengkalan Minyak; Bukit Panchur (Cantley); Pulau Besar and Walls of Malacca (Griffith). Perak, Thaiping Hills. Dindings, Lumut. Penang, Top of hill (Curtis). Lankawi (Curtis). *Distrib.* All old world tropics except India. *Native names*: Paku Wangi; Sakat Hitam. *Use*: Fronds fragrant of Coumarin; used for scenting cloths.

(22). ***P. nigrescens*** Carr. in Seem. Fl. Vit. 368. Rhizome wide creeping covered with ovate scales, roots numerous, slender, crowded. Stipes slender, 1 to 3 ft. long, glossy smooth. Fronds papery 1 to 5 ft. long, 6 to 12 in. wide, cut down nearly to the rachis into 3 to 20 linear lanceolate acuminate lobes, 6 to 12 in. long, .75 to 2 in. wide; rachis winged, midrib prominent, veins usually conspicuous but fine, broken up before reaching the edge. Sori globose, rather large in two rows halfway between midrib and edge, sunk forming prominent papillae on upper surface. *Hab.* Common in forests, Singapore, Bukit Timah. Malacca (Pinwill, Hervey). Sungei Ujong, Bukit Sulu (Cantley). Selangor, Batu Caves. Perak Sira Rimau (Yapp); Pengkalan Bharu (Kunstler); Larut (Wellesley, Robinson). Tringganu, Bundi (Rostados). Penang (Mactier) *Distrib.* India. *Native name*: Paku Chiai; Paku Sumpah.

(23). ***P. longissima*** Bedd. Ferns. S. Ind. t. 176. Rhizome long creeping, with ovate appressed scales. Stipes 3 to 4 ft. long, straw-coloured. Fronds 1 to 4 feet long, 6 to 12 in. wide cut down to the rachis except for a wing .2 in. or less wide into about 20 linear acuminate lobes about 6 in. long to .3 in. wide, papery, veins very inconspicuous. Sori oblong in one row on each side of the midrib and close to it. *Hab.* Perak, Kinta River (Kunstler); Gunong Pondok (Murton); Batu Kurau and Kwala Kemas (Matthew) *Distrib.* Indo-Malaya.

(24). ***P. palmata*** Moore Ind. 347. *Polypodium palmatum* Bl. Fl. Jav. 150, t. 64. Rhizome stout; scales narrow caudate chestnut red. Stipes .5 to 1 in. apart, rigid smooth, 6 to 12 in. long. Fronds 6 to 18 in. long, 8 to 12 in. wide, pinnate, lobes subcoriaceous linear, linear-oblong or linear sublanceolate, long acuminate, free to base, but rachis slightly winged, bases broad or narrowed, crenulate or entire, 7 to 23 distant, .5 to 1 in. wide; nerves parallel conspicuous; areoles fine, hidden. Sori rather large in a row between midrib and edge. *Hab.* Mountains, Pahang, Telom (Ridley 13961 and 13962). Perak, Thaiping

Hills (Wray, Scortechini, Kunstler): Gunong Batu Putih (Wray). Province Wellesley, Bukit Panchur (Ridley), Penang (Porter, Herb. Wallich) and all collectors. *Distrib.* Malay isles.

**Excluded species.**

*P. zosteriformis* Bedd. Ferns Brit. Ind. i. t. cxxiii. Malacca, fide van Alderwerelt van Rosenberg. The locality for this is Tenasserim, which he included under Malacca.

## 55. **Lecanopteris** Bl.

Epiphyte. Rhizome forming an ants' nest of irregular shape without scales. Stipes from conical tubercles. Fronds fleshy coriaceous, pinnate, lobes numerous, cut nearly to the winged rachis, sterile ones oblong blunt broad, fertile lobes linear-oblong narrower. Sori enclosed in indented projections of the edge. Species 6, Malay islands.

(1). ***L. carnosa*** Bl. Fl. Jav. ii. t. XCIVA. *Polypodium lecanopteris* Mett. Ann. Mus. Bot. L. B. ii, 224. Rhizome crustaceous, black with a glaucous bloom. Stipes 3 to 6 in. tall. Fronds sterile, 3 to 4 in. long, pinnate, lobes .75 in. long, .25 in. wide. Fertile fronds 6 in. to 12 in. long, lobes numerous 1.25 in. long, .2 in. wide, generally lobed. Sori in pockets at the end of the lobes about 16. *Hab.* Boughs of lofty trees. Singapore, Bukit Timah on lofty Shoreas. Malacca, Sungei Hudang (Goodenough). Pahang, Wray's Camp, Gunong Tahan (Ridley); Fraser Hill (Burkil). Selangor, Bukit Hitam (Kelsall); Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills (Hervey, Wray, Kunstler); Gunong Bubu (Murton); Gunong Inas (Yapp). *Distrib.* Malay isles.

This remarkable plant is referred by van Alderwerelt van Rosenberg to *Polypodium* in the affinity of *P. lomarioides*.

## 56. **Cyclophorus** Desv.

(*Niphobolus* Kaulf.) Epiphytic or rock ferns. Rhizomes usually slender, creeping. Fronds simple, coriaceous stiff opaque, fertile ones often narrower than sterile, under surface usually matted with woolly or cottony tomentum, veins obscure pinnate; veinlets anastomosing sometimes transversely parallel forming oblong areoles sometimes oblong hexagonal oblique areoles; veinlets free, or connivent simple or forked. Sori globose or elliptic superficial or immersed buried in tomentum. Species 93, Tropical Asia and Africa.

(1). ***C. adnascens*** Desv. Berl. Mag. v. 300. Rhizome creeping, long slender with lanceolate setaceous scales. Stipes distant, 1 to 2 inches apart, .25 to 3 in. long. Fronds sterile, spathulate or elliptic-lanceolate 2 to 4 in. long, .4 in. wide. Fertile ones lanceolate thicker and narrower, 6 to 8 in. long, .2 to .3 in. wide. All fleshy coriaceous, dark shining green above, hoary with

stellate pubescence beneath, midrib prominent, veins obscure. Areoles oblong, with 2 to 4 free clubbed veinlets. Sori rather small, sunk in the tomentum. *Hab.* On trees or rocks. Singapore (Thomson, Kunstler); Pulau Ubin; Changi Beach. Johor, Gunong Pulai (Hullett). Malacca, Pulau Undan, (Cantley); Ayer Keroh. Selangor, Ulu Gombak (Ridley). Dindings, Lumut. Perak, Arang Para (Scortechini); Larut (Wray); Kamuning (Machado). Penang (Lady Dalhousie). Setul (Ridley). Pulau Adang. *Distrib.* Africa, India, China, Malaya, Polynesia. *Native name*: Sakat Batu.

(2). ***C. varius*** Gaud. Freyc. Voy. Ur. Phys. Bot. 364, Rhizome long, slender, scales oblong-lanceolate brown, base peltate, apex acuminate, edge ciliate. Stipes 3 in. distant 1.5 to 3 in. long. Fronds sterile broad, lanceolate 3 to 4.5 in. long, .75 in. wide, narrowed to stipes, cuminate at tip. Fertile ones thicker, 12 to 18 in. long, .5 to 1 in. wide, broad lanceolate, acuminate narrowed in the soriferous part above, veins hardly visible, stellate tomentum scattered. Sori crowded in 6 to 8 rows between midrib and edge round. *Hab.* On trees. Singapore, Kranji, mangroves (Matthew). Johor, Mount Austin (Matthew). Perak, Thaiping Hills (Kunstler) Gunong Pondok and Goping (Matthew). Penang (Lady Dalhousie, Curtis).

(3). ***C. acrostichoides*** Presl. Epim. 130. Rhizome long creeping, slender. Scales large rounded oval red, centre black. Stipes distant 1 to 3 in. long. Fronds thick coriaceous linear blunt, long narrowed to stipes, fertile and sterile similar 12 to 24 in. long, .3 to 1 in. wide; stellate tomentum beneath close set. Sori crowded at the tip and sometimes all over surface, rather small in 6 to 8 rows, areoles 5 to 7 between midrib and margin each with 3 to 6 free veinlets. *Hab.* Common on trees in open country, Singapore, Tanglin; Chan Chu Kang (Ridley). Johor, Batu Pahat; Jambu Larang (Feilding). Pahang, Kwala Pahang. Malacca, Mount Ophir (Wallace). Perak, Gunong Batu Putih (Wray). Penang (Wallich), Kelantan, Kwala Pertang (Haniff). *Distrib.* Burma, Malaya, Polynesia.

(4). ***C. pannosus*** C. Christ, Ind. Fil. 200. Rhizome long, creeping, closely covered with light reddish lanceolate acuminate scales. Stipes 1 to 2 in. distant 1 to 3 in. long, covered with woolly tomentum. Fronds elliptic lanceolate blunt narrowed acuminate at base, densely softly stellate hairy beneath. Areoles in 7 series between midrib and edge, each including 2 to 4, simple or forked, free or anastomosing veinlets. Sori densely crowded rather small, 5 or 6 in a row, between the rather conspicuous parallel veins. *Hab.* Mangrove swamps, Singapore, Kranji (Ridley 6419). *Distrib.* Ceylon, Tenasserim.

(5). ***C. heteractis*** C. Chr. Ind. Fil. Rhizome long creeping, scales lanceolate acuminate base dark, tips light brown. Stipes 1 to 2 in. apart, 1.5 to 7 in. long, stellate tomentose. Fronds thick

coriaceous oblong-lanceolate, blunt, base narrowed, densely brown stellate hairy beneath 7 in. long, 1.4 in. wide. Areoles in rows of 8 to 9, between midrib and edge, enclosing 2 or 3 veinlets more or less forked and anastomosing. Sori large, prominent. *Hab.* Limestone rocks. Perak, Kwala Dipang (Kunstler). *Distrib.* India.

(6). ***C. nummulariaefolius*** C. Chr. Ind. Fil. Epiphytic. Rhizome very slender filiform covered with lanceolate long acuminate subulate reddish scales. Fronds approximate, sterile ones orbicular ovate sessile densely stellate, tomentose beneath .5 in. long, and wide; fertile fronds spathulate, stipes slender, .5 in. long, hairy, frond linear-spathulate blunt 2 in. long, .12 in. wide, stellate hairy beneath with long hairs. Sori minute, very numerous, covering the whole under surface. *Hab.* On trees. Pahang, Kwala Pahang. Negri Sembilan, Bukit Sulu (Cantley). Perak Tambun (Ridley); Kwala Dipang (Kunstler). Perlis (Matthew), Kelantan, Sungei Keteh. (Nur.). *Distrib.* Indo-Malaya. *Native name*: Berunas Jantan.

(7). ***C. penangianus*** C. Chr. Ind. Fil. *Niphobolus penangianus.* Hook. Ic. Pl. 203. Epiphyte. Rhizome very thick; scales reddish lanceolate acuminate. Stipes aggregate, stout, winged nearly to base. Fronds oblanceolate acutely acuminate long narrowed and decurrent on stipes thinly coriaceous, membranous, edge minutely sinuate, 18 in. long, 2.75 in. wide, thinly clothed with stellate hairs beneath, vein not elevate; veinlets inconspicuous. Sori forming a broad mass in the centre of the upper half of the frond. Capsules mixed with long hairs. *Hab.* Pahang, Kota Glanggi. Selangor, Kwala Lumpur (Curtis). Perak, Kinta, Goping (Kunstler). Penang (Lady Dalhousie); above the Waterfall (Hullett). Kelantan, Sungei Keteh (Nur.). *Distrib.* Burma, Java, Sumatra.

(8). ***C flocciger*** Presl. Epim. 131. Rhizome slender, scales ferruginous, base appressed points long setaceous. Stipes remote winged or grooved to base. Fronds with stipes 9 to 10 in. long .25 in. wide, very coriaceous linear acute narrowed gradually to the base, costa thick prominent, lower surface densely yellow-brown or pale tomentose, veins hidden. Sori dense, very numerous in 2 to 4 rows on each side of the costa, confluent. *Hab.* Mountains at 3500 feet alt. or upwards. Pahang, Fraser Hill, Sungei Yet (Burkill). Perak, Thaiping Hills at 3500 ft. (Haniff). *Distrib.* Malay islands, India.

(9). ***C. angustatus*** Desv. Berl. Mag. v. 300. Rhizome long, slender with numerous pale lanceolate acuminate scales. Stipes about 1 in. apart, 1 to 4 in. long. Fronds stiffly coriaceous, 6 to 18 in. long, lanceolate narrowed acuminate in the soriferous part, 1.5 in. wide or linear soriferous nearly the whole length, .3 in. wide, stellate tomentose beneath; nerves invisible, midrib prominent. Sori very large, .2 in. long, elliptic or round, sunk, pustulate

on the upper surface. *Hab.* Common on lowland trees, Singapore, Gardens, Tanglin; Pulau Ubin (Kunstler); Sungei Morai. Johor, Tanjong Bunga. Malacca (Cuming); Chabau (Griffith). Perak. Thaiping Hills; Kwala Kangsar; Ulu Bubong (Kunstler). Penang Hill; Convalescent Bungalow (Ridley). Kelantan, Sungei Keteh (Nur.). *Distrib.* Malay isles, Australia. *Native name*: Paku Hilan.

(10). ***C. stigmosus*** Desv. Berl. Mag. v. 301. Rhizome stout, covered with pale reddish brown, lanceolate acuminate hairs. Stipes approximate, 1 to 6.5 in. long, angled. Fronds 6 in. to 2 feet long, 1 to 3 in. wide, firmly coriaceous, densely stellate, tomentose and woolly beneath, lanceolate acuminate gradually narrowed below, veins distinct elevate beneath. Sori immersed minute, numerous in close lines between the veins. Areoles in 10 series between midrib and edge including many branched veinlets. *Hab.* Perak, Gunong Pondok (Kunstler); Batu Kurau (Scortechini). Perlis (Matthew). Kelantan, Sungei Ketch (Nur.). *Distrib.* India, China, Java.

## 57. **Drynaria** Bory.

Epiphytic and rock ferns. Rhizomes stout. Fronds dimorphous, one form sterile broad sessile lobed, oak-leaf shaped, the other fertile pinnatifid stipitate, broad, with numerous lanceolate or linear lobes or base of fertile frond oak-leaved, coriaceous, veins copiously anastomosing forming quadrate or hexagonal areoles. Sori rather small, numerous round or oval.

**Fronds dimorphous, fertile ones pinnatifid.**

(1). ***D. quercifolia*** Linn. Sp. Pl. 1547, sub *Polypodium*. Rhizome thick covered with red brown lanceolate subulate scales, bases cordate, up to .5 in. long. Fronds sterile 7 to 12 in. long, 7 to 8 in. wide, oak-leaved, strongly veined, midrib prominent, lobes blunt, fertile fronds 2 to 3 feet long, lobed nearly to base, lobes decurrent on rachis 5 to 9 in. long, 1 to 1.5 in. wide, oblong-lanceolate acuminate, midribs and veins prominent, veinlets transverse 4 to 6 between the veins with a network of small square areoles. Sori in rows close to the veinlets, 6 or 7 in a row. *Hab.* Trees Common, Singapore, Pulau Ubin; Kranji (Chipp). Bukit Timah (Ridley) Johor, Scudai River. Pahang, Tembeling river. Malacca, Bukit Bruang. Perak (Scortechini); Batang Padang (Kunstler). Penang (Herb. Wallich, Hose, Ridley). *Distrib.* India, Malaya, China, Fiji. *Native name.* Sakat Laipang.

(2). ***D. sparsisora*** Moore Ind. 348. *D. Linnaei* Bory. Ann. Sc. Not. v. 564, t. 12. Rhizome stout, scales ovate blunt from a peltate base, with a deciduous point. Fronds sterile brown, 6 in. long, 4 in. wide, ovate cordate, shortly broadly few lobed; fertile fronds 10 to 36 in. long, stipes 3 in. long, lobes 4 in. long 1.5 in. wide lanceolate acuminate or caudate cut nearly to rachis, veins as in *quercifolia*, areoles irregular larger. Sori more numerous,

larger and more scattered. *Hab.* Trees. Singapore, Changi; Serangoon; Tanjong Gol (Ridley). Pahang on the river, Pulau Chengei and Pulau Datoh. Perak, Batang Padang (Kunstler). Penang, Gardens near the bath. Tringganu, Bundi (Rostados). *Distrib.* Malaya, to Australasia.

The fronds are smaller and lobes narrower, the scales on the rhizome quite different, and sori more scattered, otherwise very near *D. quercifolia.*

**Fronds dimorphous, fertile fronds pinnate.**

(3). ***D. rigidula*** Bedd. Handb. Ind. Ferns 344. Rhizome stout creeping, scales bright chestnut, narrow acuminate, mixed with yellow tomentum. Fronds dimorphous, sterile, 6 to 12 in. long, 2.25 to 3.25 in. wide, oblong, cut halfway or more into narrow linear blunt lobes 1.5 long, .25 in. wide, fertile fronds 1 to 2 feet long, pinnate, lobes linear acuminate, base narrowed, edge serrulate, thinly coriaceous, petioled articulate 6 to 7 in. long, .25 to .4 in. wide, veins indistinct, areoles square, many very small. Sori in a single row on each side of the midrib sunk. *Hab.* On rocks and trees, Selangor, Semangkok Pass. Perak, (Scortechini); Bujong Malacca (Ridley). Penang (Wallich); Top of hill on rocks; Penara Bukit (Ridley). Kedah Peak, precipices. *Distrib.* Malaya, Australia.

**Fronds not dimorphous.**

(4). ***D. Heracleum*** Moore Ind. Fil. 346; Hook. Syn. Fil. p. 366. Rhizome stout, scales long silky fibrillose, bright brown. Fronds not dimorphous 6 to 8 feet long, over 12 in. wide, base broad 12 in. wide shortly, halfway or less cut into broad rounded lobes, upper part cut nearly to base into oblong lanceolate acuminate caudate lobes, 7 to 18 in. long, 2 to 4 in. wide; midrib below over half an inch through, veins distinct to edge. Areoles 6 to 8 between them. Sori small numerous, scattered, slightly immersed and elevate on upper surface. *Hab.* On trees. Johor, Tanjong Kupang, Perak, Maxwell's Hill to Boxhill (Fox). *Distrib.* Java, Philippines. *Native name*: Paku Sulo.

A very big plant. Fronds rather thinner than in *D. quercifolia* referred by v. A. v. R. to *Pleopeltis.*

*D. splendens* Bedd. Ferns of Brit. Ind. ii. t. cccxvi.

Beddome gives this from Singapore, but all I have seen of it is one barren frond with no collector's name at Kew. It is therefore excluded as doubtful.

## 58. **Drymoglossum** Presl.

Epiphyte. Rhizome very long and slender with round scarious peltate scales with dark raised centre. Fronds stipitate, sterile obovate to oblong, rounded, small, fertile linear blunt, narrowed to stipes. Veins obscure, anastomosing forming 3 or 4 series of areoles between midrib and edge, simple or branched; veinlets

tips clubbed. Sori linear scarcely immersed near the edge, sometimes confluent and covering the whole back of the frond. Species 8. Tropical Asia, Mascarenes.

(1). ***D. piloselloides*** Presl. Tent. Pterid. 227, t. 10. Rhizome filiform. Stipes .1 in. long in sterile fronds, .2 in. distant, up to 1 in. in fertile fronds. Fronds sterile rounded oblong or obovate .5 to .6 in. long, .2 to .3 in. wide, thick, fleshy, with stellate hairs when young, fertile ones linear, tip round 2 to 4 in. long, .25 in. wide. Sori in broad marginal lines. *Hab.* Branches of trees in open country, common, and very troublesome, often covering the branches. Singapore, very common (all collectors). Johor. Malacca. Perak, Thaiping (Scortechini); Kamuning (Machado). Tringganu, Bundi (Rostados). Penang (Curtis). *Distrib.* Indo-Malaya Japan. *Native name*: Sakat Ribu-Ribu.

## 59. **Brainea** Sm.

Arborescent with a short thick erect caudex. Fronds pinnate, coriaceous with numerous linear acuminate pinnae broadest at base edge serrulate, veins united to form one row of oblong or triangular areoles, then free parallel, simple or forked, numerous. Sori on the veins forming the costal areoles. Species 1.

(1). ***B. insignis*** Hook. Syn. Fil. 390. Stem 4 feet tall or less covered with long thick chestnut subulate scales. Stipes stout, over a foot tall with dense scales at base. Fronds 2 to 3 feet long; pinnae linear longacuminate, base subcordate often unequally, 4 to 5 in. long, .25 in. wide, stiff rigid, fertile fronds with narrower pinnae. *Hab.* Rocky sea coasts, very rare. Dindings, Pulau Sembilan (Ridley and Curtis). *Distrib.* Khasiya, Tenasserim, Hongkong, Yunnan, Cochin China.

The plant at a little distance looks exactly like a Cycas.

## GYMNOGRAMMEAE.

## 60. **Coniogramme** Fee.

Rhizome creeping. Stipes not articulate. Fronds pinnate, veins free or forked pinnately arranged. *Hab.* Old World tropics. Two species.

(1). ***C. fraxinea*** Diels Nat. Pflanz. 1.4, 262. *Syngramme fraxinea* Bedd. Handb. Ind. Ferns 386. Rhizome creeping. Stipes naked glabrous 1 to 4 feet long. Fronds 1 to 4 feet long, pinnate with pinnae 12 in. wide narrowed and stalked at base, or bipinnate, the secondary pinnae 3 to 6 in. long, .75 in. wide, sessile or nearly so, base round, tip long acuminate, edge entire or serrulate. Veins very close, forked from base or higher up one or both branches forked again. Sori running along each vein, but not to edge, yellow turning brown. *Hab.* Dense forest. Perak, Larut (Kunstler). Penang (Lady Dalhousie). *Distrib.* Asia, Australasia, Africa.

## 61. **Ceropteris** Link.

Tufted terrestrial ferns with rather slender stipes and pinnate to quadripinnate fronds (with the habit of *Cheilanthes*) with very numerous short, broad or oblong lanceolate lobes. Veins forked; veinlets free. Sori rising from the veins over the under surface of the fronds, linear or linear-oblong. Mostly South American. One or two North Indian and one widely spread over the East Indies, no doubt an escape from cultivation.

(1). ***C. calomelanos*** Kaulf. Enum. 76. Tufted. Stipes 18 in. wide, bipinnate, pinnules 1 in. long, lobes coriaceous, lanceolate acute, white beneath .2 in. long, bases decurrent below. *Hab.* Open places, Roadsides. Singapore, Chan Chu Kang; Pulau Ubin. Johor, Tanjong Kupang. Malacca (Hervey). Pahang, Fraser Hill (Burkill and Holttum). Selangor, Rawang; Kwala Lumpur (Goodenough). Perak, Gunong Kerbau 4000 ft. alt. (Robinson). Tringganu, Bundi (Rostados). Penang Waterfall.

## 62. **Antrophyum** Kaulf.

Epiphytic and rock ferns, with simple coriaceous lanceolate or ovate fronds stipitate without or with a midrib, veins uniform reticulate. Sori reticulate or interrupted on the veins in lines. Species 27 all tropics.

It is doubtful whether these are not all forms of one species.

(1). ***A. immersum*** Mett. Lugd. Bat. iv. 171. *A. pumilum* Hook. and Grev. Ic. Fil. xlvi. Rhizome short scaly. Fronds crowded, elongate oblong to cuneate, tip blunt or round, narrowed to a stipe, coriaceous, midrib not visible, 1.5 to 2 in. long, rarely 4 in. long, .25 to .6 in. wide. Sori immersed often forked. *Hab.* Rocks, rare. Selangor, Batu Caves, on Limestone rocks. (Holttum 8974). Kelantan, Sungei Keteh (Nur.)

(2). ***A. parvulum*** Bl. Fil. Jav. 78. t. 34. Fronds 1 to 4 in. long, .2 to .3 in. wide, thinner in texture, lanceolate, long narrowed to the base. *Hab.* Rocks, not common. Perak, Gunong Pondok and Goping (Matthew). Penang (Lobb).

(3). ***A. latifolium*** Bl. Fl. Jav. 75. Stipes distinct narrow, 6 to 7 in. long. Frond ovate abruptly cuspidate and shortly narrowed at base, sometimes with 2 or 3 cusps at the tip. No trace of midrib, 4.5 to 4.75 in. long, 2.25 in. wide. Sori lines radiating from the base. *Hab.* Rocks, not common. Sungei Ujong (Hullett). Perak (Scortechini).

(4). ***A. plantagineum*** Kaulf, Bory. Voy. de la Coq. Bot. Crypt. t. 28. Stipes distinct 1 to 4 in. long. Fronds oblong broadest towards the tip then rather abruptly narrowed, 4 to 10 in. long and 2 in. wide. Sori deeply immersed, sometimes raised on upper surface. *Hab.* Penang Hill (Ridley).

var. ***augustifolium*** Brack. Stipe 6 in. long. Frond ligulate 12 in. long, .75 in. wide, texture thinner. Perak, Gunong Sonoy (De Morgan). Not seen.

(5). ***A. reticulatum*** Kaulf. Fee 3rd Memoire Foug. 14. *A. coriaceum* Wall. Cat. 43. *A. semicostatum* Hook. Fil. 393. Rhizome short, with a mass of woolly roots. No distinct stipes as the frond is decurrent to the base. Fronds broadly lanceolate acuminate, very gradually narrowed to the base, midrib only at the base, 7 to 15 in. long, 1 to 1.75 in. wide. Areoles long and narrow elevated above in dry specimens. Sori immersed, confluent or not. *Hab.* On rocks in forests. Singapore, Bukit Timah; Selitar. Johor, Batu Pahat; Pahang, Tahan Woods; Kota Glanggi. Malacca, Alor Gajah. Negri Sembilan, Tampin (Holttum). Selangor, Gunong Hijau (Goodenough); Labu River; Batu Caves. Perak, Kinta River (Kunstler); Bujong Malacca. Penang Hill (Wallich). Pulau Adang, Rawei island. *Distrib.* Madagascar, Indo-Malaya, Polynesia.

var. ***semicostatum.*** Fronds ovate-oblanceolate abruptly acuminate, narrowed gradually to a broader base, areoles rather larger, and sori often joining, 12 in. long, 2.5 in. wide in the upper part. *Hab.* Wet tree-trunks, Dindings, Lumut (Ridley). Perak, Thaiping Hills (Kunstler, Wray); Maxwell's Hill (Scortechini). *Distrib.* Malaya.

## 63. **Loxogramme** Presl.

Rhizome creeping. Fronds entire, leathery flaccid, linear or lanceolate not articulate with the rhizome, venation quite invisible or faint. Sori in lines not reaching to the margin, species 6. Old World Tropics. These are referred to Polypodium by Christensen.

(1). ***L. involuta*** Bedd. F.S.I. t. 50. Rhizome stout, densely covered with red brown velvety roots. Stipes approximate, very short or none. Fronds large flaccid, leathery lanceolate subacute, long narrowed to base, 10 to 18 in. long, 1.5 to 3 in. wide, veins invisible. Sori in long slender lines 1 in. long, often nearly reaching the edge. *Hab.* On trees in forests. Johor, Sungei Tebrau. Sungei Ujong (Hullett); Tampin Hill (Holttum). Selangor, Semangkok Pass; Rawang Camphor forests. Perak, Kwala Dipang (Kunstler); Ulu Temengoh (Ridley); Thaiping Hills, Cottage (Hervey). Penang (Wallich, Lady Dalhousie.) *Distrib.* India. Malaya, Polynesia.

(2). ***L. lanceolata*** Bedd. F. S. I. t. 51. Rhizome slender, scales small linear brown. Stipes approximate to .5 in. distant, very short. Fronds linear or lanceolate acuminate long narrowed to the base, coriaceous, midrib prominent, veins invisible 6 to 8 in. long, .2 to .5 in. wide. Sori in short nearly vertical ascending lines. *Hab.* Mountain forests. Negri Sembilan, Bukit Tampin (Ridley). Selangor, Semangkok Pass; Ginting Bidai (Ridley).

Perak, Kinta and Larut (Kunstler); Bujong Malacca (Ridley). Kelantan, Sungei Keteh (Nur.) *Distrib.* Africa and subtropical Asia, and Polynesia.

(3). ***L. Blumeana*** Presl. Tent. 215. *L. avenia* Bak. Syn. Fil. 388. Rhizome creeping covered thickly with brown velvety roots. Stipes approximate 1 in. long or less. Fronds coriaceous linear oblong to oblanceolate shortly acute acuminate, gradually narrowed to the base, 18 to 20 in. long 2 to 3 in. wide, less coriaceous than *L. involuta,* venation clearer with moderately large areoles, primary veins not prominent. Sori in narrow linear lines oblique ascending slightly flexuous, not reaching the midrib or edge. *Hab.* Pahang, Tahan River (Ridley). Negri Sembilan, Ulu Rembau (Nur.) Penang Hill (Curtis, Maingay etc.) Kelantan, Temeyong (Haniff). *Distrib.* Malaya.

Very like *L. involuta* but with a more distinct stipe, and venation clearer.

## 64. **Syngramma** Sm.

Terrestrial ferns; rhizome short creeping. Fronds entire or pinnate rather or quite coriaceous, veins forked close to the midrib or higher; veinlets parallel and simple or anastomosing near the edge. Sori long, linear arising from the veins and veinlets. Species 16 Tropical Asia, Polynesia.

(1). ***S. Dayi*** Bedd. Journ. Bot. 1888, v. pl. 279b. Rhizome short covered with black fibrils, roots with long hairs. Stipes slender, 1 to 2 in. long. Fronds spathulate-linear blunt long narrowed to the base 2 to 3 in. long, .1 in. wide, coriaceous, veins very conspicuous ascending. Sori short, linear ascending the length of the veins. *Hab.* On quartz-rocks, rare. Selangor, Kanching (Ridley). Perak, Pass between Kwala Kangsar and Kinta at 2000 ft. alt. (Day.)

(2). ***S. campyloneuroides*** Baker Journ. Linn. Soc. xxiv. p. 261. Rhizome woody, long creeping, moderately stout, scales rather broad lanceolate caudate blackish brown. Stipes winged nearly to base, 1.5 to 5 in. long, .25 to .5 in. apart. Fronds stiffly papery, oblong cuspidate long narrowed at the base, 12 to 20 in. long, 3 to 4.5 in. wide; veins numerous distant parallel, slightly ascending .1 in. apart with distinct cross veins forming 2 areoles between each pair of veins, with a free veinlet in each. Sori in interrupted rows from midrib to margin. *Hab.* Epiphytic on stems of shrubs and very small trees, Perak, Selama, and Goping district (Kunstler.) *Distrib.* Borneo.

(3). ***S. alismifolia*** J. Sm. Lond. Journ. Bot. 4, p: 166. Rhizome creeping shortly. Stipes few, .25 to .5 in. apart, rather stout, smooth, about 4 to 8 in. tall. Fronds simple ovate, base round or very shortly narrowed, tip acuminate, coriaceous 7 to 8 in. long, 3 in. wide, veins very numerous close and parallel unbranched

inarching near the edge. Sori narrow linear on all the veins. *Hab.* Dense forests, common, Singapore (Wallich, Lobb); Chan Chu Kang. Malacca, Merlimau (Cantley); Ayer Keroh. Negri Sembilan, Bukit Kayu Arang (Cantley). Perak, Thaiping (Scortechini). *Distrib.* Malay islands. *Native name*: Paku Tombak.

var. ***Wallichii*** *S. Wallichii* Bedd. Ferns. Brit. Ind. ii. t, cliii. Rhizome creeping. Stipes 8 in. long. Fronds narrower, more coriaceous, veins ascending, very numerous. *Hab.* Damp forests, common; Singapore, Bukit Timah; Chan Chu Kang. Johor. Tanjong Kupang; Gunong Pantai (Kunstler). Perak, Maxwell's Hill.

(4). ***S. quinata*** Carr. in Seem. Fl. Vit. 372. Rhizome short. Stipes stout smooth 6 to 18 in. tall, shining brown. Fronds of 3 to 5 lobes (rarely simple) on the top of the stipes thinly membranous-coriaceous oblong-lanceolate, narrowed to base, central one 6 to 12 in. long, 1.5 to 3 in. wide, lowest pair much smaller 2 in. long, veins closely parallel ascending very numerous, simple and forked at the tip. Sori in lines nearly to edge. *Hab.* Mountain forests. Perak, Maxwell's Hill 2000 ft. (Matthew). *Distrib.* Malay islands, Polynesia.

## 65. **Hemionitis** Linn.

Terrestrial ferns simple or pinnate. Fronds stipitate, veins copiously anastomosing forming numerous areoles, with rarely a free veinlet. Sori continuous along the veins and copiously reticulate. Species 8, tropics generally.

(1). ***H. arifolia*** Moore Ind. 114. Rhizome erect. Stipes 1.5 in. long in sterile 7 in. long in fertile fronds. Fronds coriaceous, sterile oblong cordate with rounded lobes, tip round 1.5 to 2 in. long, 1 in. wide, hairy beneath, fertile sagittate, lobes acute or blunt deflexed 1 in. long .5 in. wide across the lobes, hairy beneath with stiff red hairs, venation conspicuous reticulate. *Hab.* Pastures, or on the top of rocks, usually on limestone. Perak, Larut (Kunstler), Temengoh (Ridley); Kamuning. Kelantan, Kota Bharu (Ridley). Lankawi (Curtis). Setul, Rajah Wang (Ridley).

(2). ***H. Maingayi*** Ridl. *Gymnogramma Maingayi* Bak. Syn. 517 (in part). Rhizome not seen. Stipes smooth, moderately stout 18 in. long. Fronds papyracious, glabrous, sterile pinnate with 5 or more broad oblong-lanceolate acuminate lobes, lower ones narrowed at base. Upper pair decurrent at base on midrib, terminal one ovate-lanceolate 10 in. long, 4 in. wide, lowest (seen) 8 in. long, 2.25 in. wide. Veins conspicuous distant slightly upcurved, fertile frond with about 7 pairs of much smaller distant lanceolate acuminate pinnae 5 in. long, 1 in. wide, base narrowed, terminal one ovate lanceolate 6 in. long 2 in. wide, with the upper pair decurrent on the midrib, veins prominent. Areoles numerous hairy rhomboid or hexagonal. No free veinlets. Sori on all the veins. *Hab.* Penang (Pinwill, Maingay).

Allied to *H.* (*Dictyocline*) *Griffithii* which is referred to *Aspidium* by Christensen.

## GRAMMITIDAE.

### 66. **Monogramma** Schk.

Tufted ferns with a creeping rhizome on rocks or trees, with very small linear often hair-like fronds densely crowded. Sori in the centre in a dense line partly covered with an elevate part of the midrib. Species 14. India, Malaya, Polynesia and America.

(1). ***M. dareicarpa*** Hook. Syn. Fil. 375. Rhizome long, very slender, covered with lanceolate acuminate scales. Fronds linear blunt, flat, falcate narrowed to base, .2 in. long, .05 in. wide. Sori along one side of the costa with one raised outgrowth at the side in upper front of frond. *Hab.* Granite rocks. Singapore, Bukit Timah (Matthew, Ridley). *Distrib.* Malay islands.

(2) ***M. Junghuhnii*** Hook. Sp. Fil. 123. *M. paradoxa* Bedd. Handbook 375. Epiphyte. Rhizome slender, short. Fronds densely crowded linear not narrowed at the base, rather firm in texture 2 to 3 in. long, about twice as wide as in *M. trichoidea*. Sori sunk in a furrow towards or near the top of the frond, one elevated side of costa higher than the other. *Hab.* On mossy tree branches in mountains. Perak, Gunong Inas (Yapp). Penang, Richmond Pool (Ridley). *Distrib.* Ceylon, Malay isles, Polynesia.

(3). ***M. trichoidea*** Sm. Journ. Bot. iii. 394. Rhizome very slender filiform covered with lanceolate acuminate scales. Fronds subdistant very narrow linear, hair-like, dark green, not narrowed to the base, 3 to 4 in. long, .01 in. wide. Sori in lines in a widened part of frond usually about the middle, occasionally in 2 or 3 places, edge raised on both sides. *Hab.* Granite rocks in dense forests. Singapore, Bukit Timah (Ridley). Selangor Semangkok Pass (Ridley). Perak (Bishop Hose). *Distrib.* Malay islands.

### 67. **Vittaria** Sm.

Epiphytes, rhizome creeping. Fronds linear grass-like or ribband-like, veins simple forming an acute angle with the midrib, tips prolonged into a marginal vein. Sori in a furrow in the edge or in a slightly intramarginal line with the edge of the frond produced beyond and often rolled over it. Species about 50; all tropics.

(1). ***V. angustata*** v. A. v. R. Ferns of Malay isles Supp. I. p. 57. (corrections). *V. angustifolia* Bl. (not Bak.) Enum: 199. Rhizome short creeping, scales dense, thin, brown narrowed from the base to a fine point. Fronds crowded linear acute, narrowed gradually to the base 6 to 7 in. long, .05 in. wide, rigid, marginal

furrow narrow. *Hab.* Mountains. Pahang, Fraser Hill (Burkill). Perak (Scortechini); Thaiping Hills (Matthew). Penang Hill (Ridley). *Distrib.* Java, New Guinea.

(2). ***V. elongata*** Sw. Syn. Fil. 109, p. 302. Rhizome short covered with numerous black hair-pointed scales. Fronds 6 in. to 2 feet long, .25 in. wide, stiff linear acuminate, midrib distinct beneath. Veins simple oblique immersed parallel connected with an intramarginal veinlet. Sori sunk in a marginal groove. *Hab.* Trees, common up to 5200 ft. alt. Singapore, (Wallich) Thomson Road (Murton); Green Hill (Hullett); Pasir Panjang; Sungei Morai (Ridley). Johor, Pengaram (Ridley). Muar, Sungei Pauh (Fox). Malacca, Selandor; Mount Ophir. Pahang, Pekan. Selangor, Ginting Bidai. Perak, Bujang Malacca (Ridley); Gunong Kerbau (Robinson); Gunong Hijau (Wray); Ulu Selama (Yapp). Penang (Mactier). Kelantan, Sungei Keteh (Nur). Pulau Adang. Setul (Ridley). *Distrib.* Old World tropics.

(3). ***V. pusilla*** Bl. Enum. 199. *V. falcata* Kze. Bot. Zeit. 1848 198. Rhizome thickened 1 in. long. Fronds crowded, numerous, thick, coriaceous linear blunt, 2 to 5 in. long, midrib elevate beneath in sterile fronds and base of fertile ones. Veins short oblique parallel immersed. Sori in deep intramarginal grooves. *Hab.* On trees at high elevations, Pahang, Gunong Tahan (Ridley); Kluang Terbang (Barnes); Pinetree Hill near Fraser Hill. Malacca, Mount Ophir (all collections). Selangor, Hulu Semangkok. Perak, (Scortechini); Bujong Malacca (Ridley); Gunong Inas (Yapp).

(4). ***V. sulcata*** Kuhn Linnaea 36, p. 68. Rhizome short, creeping, with numerous roots. Scales subulate. Fronds coriaceous stiff crowded ligulate, blunt sessile, veins very conspicuous forked. Sori in the much thickened tip of the frond in a deep groove intramarginal. *Hab.* On trees at high altitudes, Johor, Gunong Belumut (Holttum). Malacca, Gunong Mering and Ophir (Ridley). Pahang, Gunong Tahan (Haniff). Selangor, Bukit Hitam. Perak (Scortechini). Kedah Peak (Ridley). *Distrib.* Ceylon.

This much resembles *V. falcata,* but the sori are in a line on the edge of the fronds.

(5). ***V. lineata*** Sw. Syn. Fil. p. 109. Rhizome very short, creeping, scales acuminate with caudate points. Fronds linear very narrow acute, rather flaccid, 6 to 12 in. long, .08 to .2 in. wide, gradually narrowed to the winged stipe. Veins simple very oblique parallel. Sori in a broad intramarginal furrow, the edge of the frond beyond the furrow and at first wrapped over it. *Hab.* Very common, on trees, Singapore (Thomson, Lobb). Selangor, Ulu Selangor (Goodenough). Perak, Gunong Inas (Yapp). Penang (Mactier, Norris). Pulau Adang, Rawei island (Ridley). Kedah (Kunstler).

(6). ***V. scolopendrina*** Thw. Enum. Pl. Zeyl. 387. Rhizome stout creeping covered with dense roots. Scales long very narrow linear, hair pointed blackish brown. Stipes stout, rather distant 1.5 to 6 in. long. Fronds leathery, flaccid, linear acute, narrowed to base 1 to 2 feet long, .4 to 1.5 in. wide, midrib conspicuous. Veins conspicuous (when dry) ascending oblique. Sori in a furrow in the upper edge of the frond, inner edge of furrow winged, edge revolute over the sori. *Hab.* Common on trees from sea level to 2500 ft. alt. Singapore, Kranji: Chua Chu Kang. Pahang, Tahan river. Perak, Maxwell's Hill (Scortechini); Goping (Kunstler); Gunong Batu Putih (Wray). Penang (Curtis, Mactier). Kedah (Curtis). Lankawi, Gunong Raya at 2500 ft. alt. (Curtis). *Distrib.* Africa, Indo-Malaya.

This is far our largest species. Crested and branched forms occur not rarely. Curtis obtained in Penang a specimen branched at the tip for 7 inches, branches oblong acuminate, one rebranched, 1.5 in. wide with 4 or 5 linear projections 1.25 in. long on the edges.

### 68. **Taenitis** Willd.

Terrestrial fern. Rhizomes creeping. Stipes distinct, tall, slender. Fronds simple lanceolate or pinnate, coriaceous. Areoles copious oblique. Sori in a continuous line midway between midrib and edge. Species 2, Malay Peninsula and islands.

(1). ***T. blechnoides*** Sw. Syn. Fil. 24 and 220. Rhizome woody, creeping covered with black bristles, roots hairy. Stipes 8 to 18 in. long, stiff, glossy. Fronds 12 in. or more long, simple lanceolate 6 to 13 in. long, .5 to 3 in. wide or pinnate with 3 to 9 pinnae on each side entire or wavy 6 to 7 in. long, .5 to 2 in. wide, oblong-lanceolate long acuminate, base narrowed to a .2 in. midrib prominent. *Hab.* Very common in dry woods, from sea level to 4000 ft. alt. all over the peninsula from Singapore to Lankawi. *Distrib.* Ceylon, Malay isles. *Native names*: Paku Pijai; Paku Balu.

A very polymorphic fern. Forms with simple fronds generally occur mixed with pinnate ones. I have seen them thus from Mount Ophir; Gunong Kerbau (Robinson) Penang (Lady Dalhousie). The pinnate forms vary in the shape and size of the pinnae from nearly linear to broadly lanceolate acuminate. In a Malacca specimen (Pinwill) the line of sori is nearly marginal on the very narrow pinna, and branched forms occur.

## ACROSTICHEAE.

### 69. **Platycerium** Desv.

Huge epiphytes with no rhizome. Fronds of three forms, basal large, broad erect lobed fronds forming a cup, below them long pendent dichotomous narrow linear oblong lobed fronds, fertile

fronds distinct or forming a branch at the base of the pendent fronds, thick fleshy coriaceous reniform or round, with numerous sporanges on the back.

(1). ***P. grande*** Sm. Journ. Bot. iii. 402. Very glaucous. Barren fronds very large suborbicular, erect, deeply laciniate. Fertile fronds 4 to 6 feet long, in pairs pendent, ultimate branches 5 in. long, 1 in. wide, fertile portion flabellate obcuneate. Sporangia forming a mass in the centre only, the sides of the frond prolonged into a dichotomous forked division beyond the fruiting portion. *Hab.* North only, rare. Lankawi (Curtis). Setul (Ridley).

The locality Singapore given in many books is an error. *Distrib.* Malay isles, Australia.

(2). ***P. biforme*** Bl. Fil. Jav. 14, t. 18. Sterile fronds very large, 2 feet or more long, oblong, margin lobed and sinuate, fertile fronds very long up to 6 feet, pendulous, thin, base stipitate, with many dichotomous lobes, fertile segments separate with a large reniform fleshy lobe 6 to 8 in. across, covered except on the edges with sporanges. *Hab.* Very common all over the peninsula. *Distrib.* Siam, Burma, Malay isles.

(3). ***P. Ridleyi*** Christ; Ann. de Buitenz. Suppl. 3 (1910) p. 8. Pl. ii. *P. biforme* var. *erecta* Ridl. Journ. Roy. As. Soc. S. Br. 50, p. 56. Sterile fronds erect, 12 in. long and as wide, rounded dotted with stellate hairs, fertile fronds erect 8 to 18 in. long, 8 in. across, stiff sporangiferous lobe spathulate or obovate, hooded stalked 2 to 5 in. long and wide. *Hab.* On branches of very lofty trees 100 feet from the ground, rare. Singapore, Bukit Timah (Ridley, Matthew). Kelantan, Lata Terlong (Haniff). Kedah, Foot of Jan Jan Hill (Haniff). *Distrib.* Lingga, Borneo, Siam.

### 70. **Elaphoglossum** Schott.

Epiphytic. Rhizome elongate. Fronds entire lanceolate, stipitate or sessile, sterile and fertile similar, veins free simple or forked; fertile fronds generally sporangiferous over the whole under surface. Tropics generally. Species 280.

(1). ***E. decurrens*** Moore Ind. 8. Rhizome short stout, with numerous black roots with long red hair, scales papery thin elongate lanceolate linear reddish occurring also on the stipes. Stipes rather stout not winged to base, 3 in. long in sterile, 9 in. in fertile fronds. Fronds coriaceous thick, sterile ones broad elliptic to obovate, tip blunt, base long narrowed and decurrent on upper part of stipe, edge thickened translucent, surface sparsely dotted, midrib prominent, veinlets invisible, 3 to 5 in. long, 1.5 to 1.75 in. wide; fertile frond oblanceolate rounded at tip, edge thickened transparent. 3 in. long, .5 in. wide. *Hab.* Mountains. Pahang, Gunong Tahan (Ridley 15967). *Distrib.* Malay isles

(2). ***E. laurifolium*** Moore Ind. xvi. *E. latifolium* Bedd. Handbook, 416 not of Smith. Rhizome short rather stout covered with chestnut lanceolate acuminate scales. Stipes 3 to 6 in. long. Fronds sterile 8 to 12 in. long, 1 to 2.5 in. wide, midrib prominent, edge thickened, veins conspicuous tips clavate not reaching the edge. *Hab.* On trees. Singapore, Kranji. Mangrove swamps. Malacca (Maingay). Pahang, Tahan river; Kluang Terbang (Barnes). Perak, Top of Gunong Batu Putih (Wray). Kedah Peak (Ridley).

(3). ***E. melanostictum*** Moore Ind. 361. *E. Norrisii* Hook. Sp. Fil. v. 215. Rhizome stout woody, scales papery brown lanceolate. Fronds sterile subsessile, lanceolate-linear, coriaceous blunt long narrowed to base, midrib prominent, 10 to 15 in. long, 1 to 1.25 in. wide fertile very much narrower with a slender flat stipe 1 to 3 in. long winged to base by decurrent blade which is 6 to 9 in. long, .15 in. wide, veins immersed distinct. *Hab.* Mountains. Malacca, Mt. Ophir (Ridley). Perak (Kunstler). Penang (Norris, Maclier, Curtis). *Distrib.* Java.

## 71. **Stenochlaena** Sm.

Scandent ferns, rhizome creeping or climbing. Fronds simply pinnate, sterile with broad lanceolate pinnae articulate, fertile narrow linear, veins simple or forked free to margin. All tropics. Species 10.

(1). ***S. palustris*** Bedd. Handbook Supp. 26. Very long climbing, stems smooth pale. Fronds glabrous rather stiff when adult. 1 to 4 feet long; pinnae numerous lanceolate long acuminate base narrowed, edge serrate at the tip, veins very numerous fine conspicuous (when dry) 4 in. long, 1 in. wide, petiolate; fertile fronds as long; pinnae 6 in. long, .1 in. wide, sporangiferous to base. *Hab.* Very common in open country whole peninsula from Singapore to Tringganu and Penang. *Distrib.* India, Malaya, China, Polynesia. *Native names*: Paku Ranu; Paku Mesin, Paku miding or Lamiding. *Use.* Young fronds as a vegetable.

(2). ***S. sorbifolia*** J. Sm. Journ. Bot. 4, 149. Rhizome scandent woody stout, often 40 feet or more long; scales lanceolate subulate. Fronds 18 in. long or less, sterile pinnae oblong abruptly acuminate, base slightly narrowed edge entire or obscurely serrate, coriaceous; rachis often winged 3 to 20 pinnae on each side, 6 in. long, 1.75 in. wide, veins very numerous parallel close conspicuous; fertile pinnae narrow lanceolate undulate, 2.5 in. long on petioles .5 in. long. *Hab.* Dense forests, common up to 5000 feet elevation. Singapore, Bukit Timah. Johor, Gunong Pulai (Hullett). Ulu Kahang (Holttum). Pahang, Tahan river; Fraser Hill (Holttum). Selangor, Semangkok Pass; Gunong Mengkuang Lebah (Robinson); Telok Reserve, Klang (Burkill). Perak, Ulu

Bubong and Thaiping Hills, 3000 to 4000 feet alt. (Kunstler). Kelantan, Chaning Woods. *Distrib.* Africa, Tenasserim, Cochin China, Malay islands, S. America.

This fern has an astonishing variety of forms of foliage. In a young state, creeping over rocks and trees low down, it has a moderately stout or slender rhizome from which lying flat on the tree trunk are fronds 3 in. long with numerous pinnae, .5 in. long or less, deep green, with about 8 pairs of obovate lobes .05 in. long, entire retuse or lobed (*Davallia achilleifolia* Wall. Cat. 248). Another form is described by Matthew as having a woody and contorted rhizome and fronds like those of *Diplazium bantamense*. This form is terrestrial or grows over stumps and rocks. Above the first mentioned grow the typical sterile fronds, the lower ones of rather thin texture, the upper ones forming a thick mass at the top of the tree, above which are the fertile fronds, usually very inaccessible.

## 72. **Polybotrya** H.B.K.

Terrestrial. Rhizome short. Stipes not articulate to it. pinnate). Sterile with broad crenate or serrate pinnae, fertile frond much narrower with small oblong entire pinnae; veins pinnate all free. Species about 30. All tropics.

(1). ***P. appendiculata*** Sm. Journ. Bot. 4, 150. Rhizome shortly creeping. Stipes tufted with numerous linear black scales, 4 to 10 in. long in sterile, 10 to 12 in. in fertile fronds. Fronds sterile simply pinnate with about 60 pinnae reduced to a lobulated point at the tip, 10 in. long; pinnae oblong blunt, base truncate unequal upper edge prolonged to a short auricle, very shortly petioled, edge buntly serrate, .75 in. to 2.5 in. long by .5 to .75 in. wide. Fertile frond 7 to 10 in. long; pinnae .25 in. long densely covered with sporanges. *Hab.* On rocks in forests. Singapore, Bukit Timah. Negri Sembilan, Tampin Hill (Holttum 9541). Dindings, Lumut. Perak (Scortechini). Lankawi (Curtis).

var. ***marginata.*** Sterile fronds 12 in. long, 5 in. wide; pinnae oblong-lanceolate long-acuminate, auricle above large, more coriaceous. Penang (Norris). Adang islands, Rawei (Ridley).

var. ***Hamiltoniana.*** Sterile frond stiff coriaceous; pinnae oblong linear acuminate, tip only serrate, base truncate, uppermost decurrent on the rachis, 2.5 in. long, .5 in. wide; fertile pinnae linear 1.5 in. long. Pahang Gunong Tahan (Ridley). *Distrib.* Trop. Asia.

## 73. **Stenosemia** Presl.

Terrestrial. Rhizome short. Stipes not articulate to it. Fronds herbaceous ternate (or deltoid) or pinnate, veins anastomosing forming 1 to 2 rows of areolae between midrib and side veins;

pinnae broad, lobed in sterile fronds, narrow linear in fertile. Sporanges in globose sori crowded along the edges and solitary in the centre. Species 2. Malayan and Polynesian.

(1). ***S. aurita*** Presl. Tent. 237. t. 10, fig. 24. Rhizome erect short stout, scales blackish lanceolate. Stipes 8 in. long black shiny. Sterile fronds broad herbaceous, over 12 in. long, deltoid pinnate, 3 or 4 pairs of pinnae at base, 4 in. long, 1.25 in. wide, acuminate sessile decurrent on rachis, lobed half way or less, lobes broad rounded at the tip, lowest pair sub-bipinnate with one large pinna near base: upper pinnae entire oblong blunt getting smaller to the top. Fertile fronds 12 in. long pinnate; pinnae lanceolate or linear with numerous linear or oblong blunt lobes, some on the lowest pinna, 1 in. long, .1 in. wide, the others about .25 in. long smaller towards the tip. Sori crowded along the edges of the lobes with 1 or 2 detached lower down. *Hab.* Thick Jungle among limestone rocks. Pahang, Kota Glanggi (Ridley). Selangor, Batu Caves. Malacca (Hervey). Perak, Kwala Dipang; Goping (Kunstler). *Distrib.* Malay isles, Solomon isles.

## 74. **Hymenolepis** Kaulf.

Epiphytic, rhizome shortly creeping. Stipes tufted articulate to rhizome. Fronds entire, bases broad linear or oblong, apices caudate or spoon-shaped densely soriferous, veins in sterile part copiously anastomosing. Areoles with free included veinlets. Sporangia densely covering the underside of the fertile caudate (or spoon-shaped) tip. Species 4. Tropical Asia, Polynesia, Mascarenes.

(1). ***H. spicata*** Presl. Epimel. 159. *Gymnopteris spicata* Presl. Tent. Pter. 244, t. 11. Rhizome short covered with dense roots. Stipes 1 to 8 in. long, winged to base or nearly. Frond linear-oblong or linear rather flaccid, thinly coriaceous, 6 to 12 in. long .3 to 2 in. wide, midrib stout, soriferous tail 1.5 to 6 in. long, .05 to .1 in. wide. *Hab.* Trees in orchards, campongs etc., rather variable in size, the big form with fronds to 2 ft. 6 in. long, 2.5 in. wide is var. *latifrons*. Johor, Pulau Tiuman (Ridley). Pahang, Fraser Hill (Burkill and Holttum). Perak, Maxwell's Hill, and cottage Thaiping Hills (Kunstler, Ridley); Gunong Inas (Yapp). Penang (Lady Dalhousie) at 2000 to 2500 feet (Matthew, Ridley). Kedah. *Distrib.* Mascarene islands to Polynesia.

A specimen of what appears to be an abnormal form, with upper half of the frond flat and .25 in. wide, soriferous, was collected by Matthew in Penang.

## 75. **Acrostichum** Linn.

Tidal swamp fern, forming large clumps. Fronds large pinnate, upper pinnae smaller and entirely covered beneath with sori, lower ones broader sterile, veins copiously anastomosing forming

numerous sub-quadrate areoles, with no free veinlets, no main veins. Species 2. Tropics generally.

(1). ***A. aureum*** Linn. Sp. Pl. 1525. Caudex erect very stout short. Stipes 1 to 2 feet long, tufted. Fronds 2 to 6 feet long; pinnae lower 6 to 12 in. long; lower oblong sub-acute, coriaceous 1 in. wide or less, upper fertile 4 in. long .5 in. wide. *Hab.* Common in tidal swamps over the whole peninsula, occasionally persisting inland after the tidal river has silted up, as at Tanglin Botanic Gardens, Johor, Base of Gunong Pantai, and Malacca, Bukit Asahan.

There are two forms, one smaller with narrow pinnae, and one large size with big and broad pinnae. The very young seedling plants have ovate leaves. *Distrib.* All tropics.

### 76. **Photinopteris** Sm.

Epiphytes. Stipes adherent to rhizome. Fronds pinnate, lower pinnae articulate with rachis, broad oblong or ovate acute, upper ones (fertile) narrow linear; veins parallel, veinlets anastomosing forming areoles with free included veinlets. Species 2. Malayan.

(1). ***P. drynarioides*** Bedd. F. B. I. t. 325. Rhizome covered with long yellow brown thin lanceolate scales. Stipes broadly winged to base. Frond 3 feet long or more, base broad shortly lobed, lobes rounded; upper pinnae coriaceous shining, oblong acuminate, base broad strongly nerved, 7 in. long, 1.75 in. wide, uppermost portion fertile, 12 in. long; very narrowly pinnate, pinnae .03 in. wide and 7 in. long. *Hab.* On trees in mountain districts, local. Perak (Scortechini). Penang (All collectors). *Distrib.* Malay isles, Solomon isles. Christensen keeps this separate under the genus *Dryostachyum.*

(2). ***P. rigida*** Bedd. Ferns Brit. Ind. t. 211. Rhizome elongate covered with reddish short close scales. Stipes distant 10 in. long rather slender not winged, smooth. Fronds 1.5 to 3 feet long, sterile pinnae hard coriaceous, ovate long-acuminate, base cuneate 6 in. long, 2 in. wide; petiole .1 in. long articulate, veins conspicuous especially above, fertile pinnae (on some fronds) 1 to 7, terminal linear, 7 in. long, .12 in. wide. *Hab.* On boughs of trees over streams and on mangroves. Singapore (Wallich), Kranji; Woodlands (Matthew); Bukit Timah (Murton). Johor. Pahang, Fraser Hill (Burkill and Holttum 8845). Perak, Gunong and Batang Padang (Kunstler). Penang (Mactier, Curtis). *Distrib.* Malay islands.

### 77. **Cheiropleuria** Presl.

Terrestrial. Rhizome thick woolly. Stipes long slender. Frond ovate entire or bifid at the top, coriaceous. Fertile fronds linear-lanceolate narrowed to both ends with 3 prominent ribs. Species 1.

(1). ***C. bicuspis*** Presl. Epimel Bot. 189. Rhizome thick 1 in. long covered with soft yellow hairs. Stipes slender wiry 8 or 9 in. long. Sterile fronds ovate-lanceolate or lanceolate, 4 to 7 in. long, 1 to 1.25 in. wide or with 2 long cusps at the tip, 7 in. long 2 to 4 in. wide, with 3 to 6 strong veins from base. Fertile fronds smaller. *Hab.* Mossy dry spots on high mountains 3000 to 5000 feet alt. Malacca, Mt. Ophir (Ridley). Pahang, Gunong Tahan (Ridley). Perak, Thaiping Hills; Gunong Kerbau (Robinson). *Distrib.* Malay isles, Formosa.

## 78. **Leptochilus** Kaulf.

Terrestrial. Rhizome short or long. Stipes not crowded. Fronds pinnate, with 3 to many broad pinnae, veins copiously anastomosing with free veinlets in the areoles. Fertile fronds with smaller and narrower pinnae, densely covered with sporangia. Species 65 all tropics.

(1). ***L. decurrens*** Bl. Ennum. 206. *Gymnopteris variabilis* Hook. Sp. Fil. v. 277. Rhizome creeping rather stout. Stipes 1 to 2 in. apart, 4 or 5 in. tall and winged nearly to base in sterile more slender not winged 9 or more in. tall in fertile fronds. Frond sterile simple broad lanceolate long acuminate, narrowed to the base and decurrent on petiole, 7 to 12 in. long, 2 to 3 in. wide, veins numerous, parallel; fertile fronds very narrow linear 7 to 10 in. long, .1 in. wide. *Hab.* Perak (Scortechini). *Distrib.* Indo-Malaya.

(2). ***L, heteroclitus*** C. Chr. Ind. 11. *Gymnopteris flagellifera* Wall. Bedd. Handb. 433. Rhizome short woody when terrestrial, of some length when climbing up trees, densely covered with brown lanceolate scales. Stipes sometimes densely scaly. Fronds simple or tri-foliate or pinnate with 5 to 11 pinnae, the terminal pinna often much prolonged and rooting at the tip; pinnae stalked entire or repand, 4 to 5 in. long, 2 in. wide, main veins prominent to the margin. Fertile pinnae much narrower linear, 4 to 5 in. long, .5 in. wide densely covered with sporanges. *Hab.* Muddy spots by streams. Singapore, Stagmount; Pulau Tiuman. Selangor, Rawang; Ulu Gombak (Ridley). Perak, Sira Rimau (Yapp); Goping (Kunstler). Kelantan, Kampong Parit (Haniff). *Distrib.* Indo-Malaya, Polynesia.

(3). ***L. Preslianus*** C. Chr. Ind. 16. *Gmynopteris Presliana* Hook. Sp. Fil. v. 265. Rhizome very stout covered with deciduous lanceolate scales. Stipes 6 to 10 in. tall sparsely scaly. Fronds 6 to 12 in. long, pinnate; pinnae sub-membranous narrow lanceolate petioled acuminate and narrowed to base, 6 in. long, .25 in. wide. Pinnae of fertile fronds shorter narrower, and lower ones longer petioled; veins distant simple or forked at base with a few veinlets forming large areoles. *Hab.* On rocks in streams. Lankawi, Gunong Raya (Curtis). *Distrib.* Madagascar, S. India, Philippines.

I do not find the venation of this at all like that figured and described by Beddome.

(4). ***L. Zollingeri*** Fee, Gen. 55. *Gymnopteris subrepanda* Hook. Syn. Fil. p. 419. Rhizome woody long creeping. Stipes 15 in. long, stout. Sterile fronds, simple 12 in. long, 1.5 to 2 in. wide to pinnate 2 feet long, 12 in. wide; pinnae lanceolate acute acuminate, or oblong-lanceolate 1 to 1.5 in. wide sessile or shortly stalked, subcoriaceous, veins distinct nearly to edge with copious areoles. Pinnae of fertile fronds lanceolate 4 in. to (terminal one) 7 in. long, .3 to .1.5 in. wide densely covered with brown sporanges. *Hab.* Forests sea level to 5000 feet alt. Singapore, Bukit Timah. Malacca (Hervey). Negri Sembilan, Tampin Hill (Holttum); Ulu Rembau (Nur). Perak, Chanderiang and Thaiping (Kunstler); Cottage, Thaiping Hills (Ridley). Penang, (Norris, Mactier, Curtis). *Distrib.* Malay islands.

(5). ***L. axillaris*** Kaulf. Enum. 147, t. 1, fig. 10. *Gymnopteris axillaris* Cav. Praelect. 1801 n 582. *G. variabilis* var. *axillaris* Bedd. F. B. I. p. 430. Rhizome creeping 20 to 30 feet long. Stipes 2 in. apart, 2 in. long slender. Fronds sterile simple lanceolate herbaceous, acuminate long narrowed at base, 12 in. long, 2 in. wide, veins inconspicuous; fertile fronds stipes rather longer, very narrow linear 9 to 11 in. long, .08 in. wide densely covered with sporanges. *Hab.* On tree trunks dense forest 300 to 500 feet alt. Perak, Kinta and Ulu Bubong (Kunstler). *Distrib.* India, Burma.

(6). ***L. virens*** C. Chr. Ind. Fil. *Gymnopteris contaminans* Bedd. Ferns Brit. Ind. Suppl. 27. Rhizome thick, woody. Stipes stout scaly with brown scales and at base lanceolate acute scales, over 12 in. long. Fronds sterile pinnate with 11 to 30 distant lanceolate acuminate coriaceous pinnae, bases shortly cuneate, midrib prominent, veins parallel horizontal conspicuous, veinlets meeting in arches and forming areoles, 4 to 6 in. long, 1.5 in. wide petiole .08 in. long. Fertile fronds, pinnae lanceolate acuminate blunt, 2.25 to 3 in. long, .25 to .5 in. wide, densely covered with sporanges. *Hab.* Perak (Scortechini). Penang (Wallich). Pulau Adang (Ridley). *Distrib.* Indo-Malaya.

(7). ***L. rumicifolius*** Ridl. Tufted plant rhizome not creeping covered with long chestnut brown lanceolate acuminate scales, roots numerous long haired. Stipes 1 to 4 in. long hairy (at base only in fully developed fronds). Fronds of young plants, lanceolate acuminate base narrowed to petiole and shortly decurrent or not, hairy on both sides, 4 to 5 in. long, 1.75 in. wide; veins parallel ascending towards tips, elevate beneath. Adult leaves trifid palmate, lobes lateral lanceolate long acuminate, cut to within .15 in. of rachis, shortly decurrent below, 3.5 in. long, .75 in. wide; veins distant parallel, venules transverse sinuous with branches forming areoles containing free veinlets. Fruiting fronds not seen. *Hab.* Selangor, Klang Gates on sandstone rocks in shade (Ridley).

This seems to be most nearly allied to *G. taccaefolium* Hook, of the Philippines, but is smaller, very hairy in the young state with the frond hardly decurrent on the stipes. Fertile fronds should be looked for.

### 79. **Lomagramma** Sm.

Climbing ferns about 50 feet long with dimorphous fronds allied to and resembling *Stenochlaena*. Sterile fronds pinnate; pinnae articulate oblong-lanceolate broad, truncate at base, veins reticulated in hexagonal areoles, no free veinlets. Fertile fronds much contracted and normally covered with sori on the under side sometimes only partially so.

Considered a section of *Leptochilus* by Rosenberg. Species 2.

(1). ***L. lomarioides*** Sm. Hist. Fil. 143. Rhizome strong covered with a spongy indumentum. Stipes 6 to 8 in. long scaly. Fronds up to 3 feet long, 6 in. to a foot wide; pinnae numerous dark green membranous deciduous when dry, sterile ones .5 to 1 in. wide oblong lanceolate base truncate inaequilateral, tip serrate or crenate, under surface pellucid dotted; fertile pinnae .25 in. wide. *Hab.* Climbing on trees in limestone districts. Selangor, Batu Caves (Matthew). Penang (Curtis). *Distrib.* Indo-Malaya.

Mr. Matthew notes. "The fronds are of an uniform lomarioid type except a few at the tip end, (of which he sends a specimen); in these most of the pinnae are reduced to flabellate pinnae with rounded slightly lobed top and cuneate base, .3 in. long and wide which the specimen shows are derived from the enlarged upper auricle of a typical pinna."

(2). ***L. perakense*** Bedd. Handbook. Suppl. 107. Rhizome 40 to 50 feet long and one in. through. Frond sterile, 3 to 4 feet long. Stipes 6 to 8 in. apart, 1 foot long, deciduously scaly, rachis not winged upwards very stout; pinnae coriaceous linear-oblong acuminate entire or undulate, base narrowed cuneate or oblique shortly petioled, 6 in. long, 1 in. wide, midrib elevate beneath veins similar to *lomarioides* but closer and smaller. Fertile pinnae .12 to .8 in. wide, not seen. *Hab.* On tree trunks at 500 to 3000 feet alt. Rare. Perak, Chanderiang, and Thaiping (Kunstler.)

## PARKERIACEAE.

### 80. **Ceratopteris** Brong.

Aquatic fern fleshy herbaceous. Stipes tufted thick. Fronds barren simple or little divided, fertile bi-tripinnate with narrow linear segments. Sori on 2 or 3 anastomosing nerves parallel with edges. Capsules scattered on receptacle sub-globose. Indusium formed of reflexed margin of fronds. One species, all tropics.

(1). ***C. thalictroides*** Brngn. Bull. Soc. Philom. 1821, 186. *Hab.* In ditches. Singapore (Wallich); Gardens; Ang Mokio; Selitar; Changi (Ridley 4227). Pahang, Pekan (Ridley 1509). Malacca, (Hervey). Selangor, Bukit Bintang (Goodenough). Penang (Norris); Tanjong Bunga (Curtis). Kelantan, Kamposa (Ridley). Lankawi isles (Curtis). *Distrib.* All tropics.

## MARATTIACEAE.

### 81. **Angiopteris** Hoffm.

Caudex stout, as broad as long covered with broad leaf bases. Fronds very large; petiole stout, fronds bipinnate; pinnae articulate herbaceous linear oblong. Sporangia opening by a slit at one side or an apical pore, usually joined in masses in a linear band along the edge of the pinnae. Species according to De Vries 62, according to Baker one, whole tropics.

(1). ***A. evecta*** Hoffm. Schk. Gen. t. 151. Caudex 1 to 2 ft: long, over 12 in. through rounded. Fronds 6 to 20 feet long; pinnae 1 to 3 feet long, pinnules 4 to 12 in. long, .5 to 1.5 in. wide, linear oblong acuminate shortly stalked, veins sub-parallel, numerous close. *Hab.* Damp forests on rocks and on the ground, not rare. Singapore, Bukit Timah (Hullett, Murton). Pahang, Pekan. Perak, Maxwell's Hill (Scortechini, Kunstler); Ulu Kerling (Kunstler). Penang (Mactier). In tertiary rocks in Selangor, fossil. *Distrib.* Madagascar, Indo-Malaya, Australia.

(2). ***A. Norrisii,*** Rosenstock Med. Ryks. Herb. Leiden 31, p. 2 (1917 to 1918.) Fronds bipinnate subcoriaceous-chartaceous slightly pilose scaly beneath, pinnules distinctly petiolate linear-oblong from an unequal base, t.p linear serrate, no recurrent veins. Sori sub-marginal of 9 or 10 sporanges. Indusium pilose. *Hab.* Malay Peninsula (Norris).

I have not seen this and there is no specimen from Norris of any *Angiopteris* at Kew. It is probably a form of *A. evecta.*

### 82. **Kaulfussia** Bl.

Terrestrial with swollen fleshy rhizome. Fronds with long fleshy stipes, palmate with 3 or 5 fleshy herbaceous oblong elliptic lobes, veins parallel, veinlets copiously anastomosing with free veinlets in the areoles. Sori scattered of 10 to 15 sporangia in circular masses hollow in the centre, sporangia opening inside the cup. Species 1. Tropical Asia.

(1). ***K. aesculifolia*** Bl. En. Pl. Jav. Fil. 260. Stipes 12 to 18 in. tall, fleshy dusky pubescent. Fronds of 3 to 5 pinnae central one biggest, oblong spathulate or obovate, 10 in. long, 4 in. wide acutely acuminate base narrowed, midrib thick pubescent, the other lobes smaller. *Hab.* Dark wet muddy spots in forests

often in large masses, local. Selangor, Batu Caves (Ridley). Perak, Thaiping Hills (All collectors); Goping (Kunstler); Temengoh (Ridley).

## SCHIZAEACEAE.

### 83. **Lygodium** Sw.

Slender climbing ferns often of great length. Fronds pinnate or palmate, herbaceous, veins forked free. Sporangia in the axils of imbricating involucres, forming spikes in separate pinnae or in rows on the edges of leafy ones. Species 25 Tropical and subtropical Asia, and Africa, rare in the New World.

(1). ***L. circinnatum*** Sw. Syn. Fil. 153. *L. dichotomum* Bedd. F. S. I. 62. Stems rather strong. Fronds sterile bipartite into 2 palmate lobes of 2 to 3 acuminate oblong linear lobes, 5 to 11 in. long, .75 to 1 in. wide, strongly nerved; fertile fronds similar but hardly .25 in. wide entirely edged with the small .08 in. long spikes of sporanges. *Hab.* Open country, edges of forests, very common. Singapore Tanglin; Bajau. Johor, Kluang (Holttum). Malacca, Sungei Hudang; Chabau. Pahang. Tahan river. Perak, Larut and Gunong Bubu (Kunstler); Waterfall Hill (Wray); Ulu Temengoh (Ridley). Penang (Wallich). Tringganu, Bundi (Rostado). Kedah Peak (Haniff). Lankawi (Curtis). Kelantan, Kampong Parit (Haniff); Sungei Keteh (Nur.) *Distrib.* Indo-Malaya, China. *Native names* Ribu-Ribu Dudok or Bukit; Paku Jari Merah.

(2). ***L. microphyllum*** Br. Prod. 162. Slender climber. Fronds simply pinnate, pinnules petioled 3 to 4 on each side of the rachis with a terminal one. Sterile ones ovate-oblong blunt sometimes slightly lobed, base round or cordate, .5 to 1 in. long, .25 in. wide; fertile ones oblong deltoid base truncate, tip round, 1.5 in. long; .4 in. wide. Spikes of sporangia numerous along the whole edge. *Hab.* Not rare in open grassy places. Singapore, Kranji; Botanic Gardens. Johor, Kampong Bharu; and Tebing Tinggi (Ridley). Malacca (Griffith). Perak (Scortechini.). Penang (Wallich). *Distrib.* Indo-Malaya.

(3). ***L. flexuosum*** Sw. in Schrad. Journ. 1800 p. 106. *L. pinnatifidum* Sw. l.c. in part. Stoutly wiry climber. Fronds pinnate, rachis and branches pubescent or glabrous; pinnae entire oblong blunt, base broad with sometimes a lobe at the base, or several distinct rounded lobes at the base; sterile fronds 3 in. long, .75 in. wide, fertile ones 2 in. long or less. Sporangia spikes .1 in. long numerous. *Hab.* Open country, common. Singapore, Botanic Gardens. Pahang, Kwala Tembeling. Malacca, Pengkalan Minyak. Perak, Thaiping near Waterfall (Matthew). Penang Hill; Telok Bahang (Curtis). Kedah Peak. Tringganu, Bundi (Rostados). Kelantan, Kwala Lebir (Gimlett); Batu Papan, Sungei Keteh (Nur.) *Distrib.* Indo-Malaya, Africa.



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var. ***alta*** Clarke. Pinnae 8 in. long. *Hab.* Perak (Kunstler). *Native names*: Ribu-Ribu Gajah; Akar Sidin.

(4). ***L. polystachyum*** Wall. Cat. 177. Stems wiry pubescent. Fronds pinnate, 8 to 15 in. long; pinnae numerous, distant oblong acuminate, base truncate, 2 in. long, .5 in. wide, lobed half way nearly to base, lobes about 15 on a side, oblong blunt .1 to .2 in long. Fertile ones with a slender soriferous point, .25 in. long or less. *Hab.* Fairly common especially in the north. Pahang, Kwala Tembeling (Ridley). Malacca (Hervey, Pinwill). Perak, Gunong Pondok (Matthew). Penang (Wallich); Hill (Maingay); Telok Bahang (Curtis). Kedah, Alor Star, (Ridley.) *Distrib.* Burma, Anam.

## 84. **Schizaea** Sm.

Small terrestrial ferns, tufted. Stipes long slender flat or terete. Fronds fan-like dichotomously branched or simple, fertile segments terminal, digitate bearing sori. Capsules in 2 to 4 rows on one side of the fertile segments, 2-valved opening down the side, and terminated by an opercular ring. Species 25 all tropics.

(1). ***S. dichotoma*** Sw. Mem. Act. Turin v. 422, t. 9, f. 9. Stipes 6 to 18 in. long, slender terete channelled. Frond fan-like many times dichotomously branched, the ultimate divisions linear acute about 1 in. long, whole frond 3 in. long 4 in. wide; fertile segments 8 to 12, linear with 2 rows of sporangia, .1 in. long. *Hab.* Common in rather dry woods, and sandy spots. Singapore, Tanglin (Murton); Toas; Pasir Panjang; Kranji. Johor, Pengaram; Gunong Pulai. Pahang, Kwantan (Craddock); Rumpin river; Pakan (Ridley); Gunong Tahan (Haniff). Malacca, Ayer Panas (Griffith); Brisu and Sungei Hudang (Derry). Perak, Ulu Kal (Kunstler). Penang, Waterfall Valley (Haniff). *Distrib.* Trop. Asia, Mascarenes, Australia, New Zealand, Trop. America.

Depauperate forms 6 to 8 in. tall with 2 to 4 branches only often occur.

(2). ***S. malaccana*** Bak. Syn. Fil. p. 428. Densely tufted. Stipes very slender 5 in. long, sub-terete channelled. Frond fertile segments 8 to 13, linear, .12 in. long often bi-lateral in 2 rows. *Hab.* Mossy spots in mountains at 3000 to 5000 feet alt. Malacca Mt. Ophir (All collectors). Pahang, Gunong Tahan (Ridley). Perak, Gunong Inas (Yapp); Gunong Bubu (Wray. Murton). Kedah Peak. Kelantan, Gunong Sitong (Nur.) *Distrib.* Malay isles.

(3). ***S. digitata*** Sw. Syn. Fil. 150, 380, t. 4. Stipes tufted linear, flat green, 12 to 15 in. long, .1 in. wide. Frond of 15 to 17 linear acute lobes, 1.5 in. long. Sporangia very small in 4 rows. *Hab.* Common in forests. Singapore, Garden Jungle; Reservoir Woods. Johor, Tanah Runto. Pahang, Kwala Tembeling, Gunong Tahan. Malacca, Pengkalan Ampat; Selandor; Ayer Panas (Grif-

fith). Negri Sembilan, Kwala Pedas. Selangor, Batu Caves; Rantau Panjang (Kloss). Perak, Thaiping Hills, Waterfall (Wray) to the Tea Gardens (Ridley); Kota Bharu (Kunstler). Penang Hill, Kedah Peak. *Distrib.* Indo-Malaya, Polynesia.

## OPHIOGLOSSACEAE.

### 85. **Ophioglossum** Linn.

Rhizome small. Fronds simple rarely forked herbaceous, usually solitary small ovate with a spike of sporangia rising from the base of the sterile frond, bearing 2 rows of close set sporanges; rarely (*O. pendulum*) fronds thin linear simple or forked, fertile spike from low down on the sterile part. Species 43. Whole world.

(1). ***O. reticulatum*** Linn. Sp. Pl. 1518. Rhizome cylindric short. Stipes 1 to 2 in. long, sterile lobe ovate blunt rounded at tip, base broad rounded or cordate, .5 to .75 in. long, .25 to .5 in. wide. Fertile spike very slender, 1 in. long, stalk 3 in. long. *Hab.* Not common. Penang, dry spots near Waterfall (Ridley) *Distrib.* Eastern tropics.

(2). ***O. nudicaule*** Sw. Syn. Fil. t. 4. Rhizome small tuberous. Stipes 2 to 3 in. long, sterile frond ovate narrowed to base, tip blunt, 1 in. long by .5 in. wide. Fertile spike 1.5 in. long on a stalk 4.5 in. long. *Hab.* Grassy spots. Singapore, Bukit Panjang and Chan Chu Kang. *Distrib.* All tropics.

(3). ***O. pendulum*** Linn. Sp. Pl. 1518. Epiphytic. Fronds flaccid pendulous, ribbon-like linear, 1 to 3 feet long, 1 to 3 in. wide, simple or forked, no midrib. Fertile spike 2 to 6 in. long from above the base of the sterile segment. *Hab.* On trees or on *Platyceriums,* hanging down from below the plant. Singapore, Bukit Mandai; Tanglin. Malacca (Griffith). Pahang, Fraser Hill (Burkill). Selangor, Rawang, Kanching. Perak, Gunong Batu Putih (Wray). *Distrib.* Mauritius to Polynesia.

### 86. **Helminthostachys** Kaulf.

Rhizome fleshy creeping. Stipes fleshy rather tall solitary. Frond fleshy membranous, palmately pinnate in 3 divisions again forked. Fertile spike from the base of frond stipitate. Sporanges in a long spike of clusters. Species 1, Tropical Asia.

(1). ***H. zeylanica*** Linn. Hook. Gen. t. 47. *H. dulcis* Kaulf. Flora 1822, 103. Terrestrial, with numerous roots. Stipes 12 to 15 in. tall. Fronds of 2 stalked pinnae each divided into 2 or 3 lanceolate pinnules, 4 in. long, 1 in. wide. Spike thick, 4 in. long, peduncle 3 in. long. *Hab.* Muddy spots in shade open country, sporadic. Malacca Brisu (Derry). Pahang, common along the Pahang river; Labong Endau (Evans). Selangor, near Batu Caves. (Ridley). Perak, Blanja (Wray); Sungkei (Kunstler); Temengoh (Ridley). Naungchik, Ismail Rantau (Down). *Distrib.* Trop. Asia, Australia.

# Cameron's Highlands

A good deal of interest has been taken recently in Cameron's Highlands, in connection with the possibility of development of the place as a sanatorium for Malaya. Though it has been established that what is now known as Cameron's Highlands is not the area visited and described by Mr. Cameron in 1885, yet Mr. Cameron's explorations are of sufficient historical interest to justify some record; and the précis of official correspondence, which I annex, may be considered worthy of publication in the Society's Journal. The précis was prepared, at my request, by Mr. J. D. M. Smith and Mr. H. C. Rendle, both of the Malayan Civil Service.

I also annex a copy of a letter written by Mr. Cameron on the 9th April, 1886, to Mr. C. V. Creagh, who was then Assistant Resident, Perak. This letter also may be considered worthy of publication.

W. GEORGE MAXWELL.

* * * * *

The earliest information which can be traced regarding Mr. William Cameron's movements is contained in a letter from him to Mr. (now Sir) F. A. Swettenham. This letter was written from Singapore on the 20th December 1884, and in it Mr. Cameron stated that he proposed "leaving this for Perak before the end of the month." (Pk. 50/85).

Mr. Cameron eventually arrived in Taiping about the 16th February 1885. (Pk. 956/85).

On the 6th March 1885 Mr. Cameron wrote from Lady Weld's Rest House at Padang Rengas forwarding sketches which he had made from Gunong Bubu during his journey from Taiping to Padang Rengas. He said that he intended to proceed to Kinta, as suggested by the Resident, but that he would be glad of more definite instructions as to what he was to do. (Pk. 1134/85).

There is no record of these instructions, but he evidently received them because, in a letter dated the 9th April 1886 written from Ulu Slim, he wrote as follows:—

> "For your information and in order that you may communicate with Sir Hugh Low on the subject I will for the present (it must be very briefly for a full account would occupy a long report and much time) recapitulate my movements ab initio.....

"My first exploration expedition began in February last "year. My instructions were to go to Waterloo Estate, thence "up Bubu, thence to Gunong Chabang on the Raia via Batu "Gajah: from Chabang, due East down into Pahang, and "cross south so as to come out about Ulu Bernam or Selangor.

"This I followed literally opening an entirely new track "across the valleys of the Raia, Penoh and Anak Kinta, and "made a pass over into the Upper Valley of the Telom at "fully 5,000 feet. There I discovered a new and very in- "teresting plateau of country maintaining for miles an "average elevation of 4,500 feet on the rivers' banks: but "this is in Pahang territory. I ascended a number of moun- "tains and took many sketches with elaborate details in the "way of bearings both on Perak and Pahang territory as also "on Kelantan. I came out near Ulu Mut (?) on the Slim, "then on to Bernam, thence to Sungkai and down to Telok "Anson, keeping up a consecutive system of sketchings and "detailed bearings. I then returned to Taiping, reported "myself, and progress—produced sketches and plottings to "Mr. Swettenham and also to Mr. Caulfeild. (Pk. 1695/86).

It would seem that this expedition was finished by the 1st September 1885, as there is a letter to Mr. Lister (the Assistant Resident) written on that date from the Rest House (presumably in Taiping) asking him to inform the Resident that he (Mr. Cameron) had just arrived there. He stated that he had left Ulu Bernam on the 23rd, and Teluk Anson on the 30th of August, and had come to Taiping via Penang. (Pk. 3806/85).

In a letter from Taiping dated the 4th September 1885, Mr. Cameron wrote to Mr. (now Sir) F. A. Swettenham as follows:—

"I propose to go to Kuala Kangsar today if I can or "tomorrow morning, to see that arrangements are made com- "plete for an immediate start without loss of time on my "return from Singapore....."

After discussing the various arrangements which he asked should be made, he outlined his proposed movements as follows:—

"I propose to return (i.e. from Singapore) direct to "Teluk Anson and go up the Bernam through one of the "delta into that river, and on to Ulu Bernam and Kerling, "where I hope to do my work with men only as the unmade "roads are a trouble. Meantime the elephants will go back "to Ulu Slim, and then we keep persistently up and down "the extreme ulus of the various rivers and in and round the "mountains thereof, until we get a complete survey, up to "Ulu Kampar.

Mr. Cameron left for Singapore on the 20th October 1885. He had previously been to Singapore on the 13th September, and had returned on the 29th September 1885. (Pk. 4439/85).

On the 22nd September he was in Kuala Kangsar, as he wrote thence to Mr. (now Sir) F. A. Swettenham. (Pk. 464/85).

In a minute paper Pk. 5438/85 there is a fragment of a letter by Mr. Cameron in which he writes as follows:—

> "I will only add that we had a most successful time "on Changkat Asah* which I ascended for the second time, "and slept two nights there."

Apparently, by the 12th December, 1885 he had returned to Tanjong Malim, as a letter written on that date, relating to progress of his work, was received in Taiping at the end of the month. (45/85).

On or about the 8th March 1886 a letter was received from Mr. Cameron, undated, and written from the pass between the Bernam in Perak and Ulu Liang in Pahang. In recounting the work that he had done, he stated:—

> "I have obtained very elaborate, complete and satis- "factory bearings of the country between Selangor and Perak "and the two States with their principal mountains and hills "as well as salient points on the coast line can now be "correctly tied together. I go from here into Ulu Slim "and round the ulus of the Sungkai, Batang Padang and "Kampar." (1274/86).

In a letter from Ulu Slim dated the 19th April, 1886, Mr. Cameron wrote:—

> "It was arranged with Mr. Swettenham that I should "thoroughly survey the mid country between Selangor and "Perak so as to join the two States accurately, and with "as full information and detail as practicable. This was a "very important piece of work, and rather an anxious one "for me, for I had to take up all the threads of my Selangor "survey and tie them on to Perak, and thus was putting a "crucial test to my former work. I am happy to say that "I have been enabled to accomplish this with greater success "than I even hoped..... Mr. Swettenham was "anxious that I should explore the unknown country at the "extreme ulus of the Slim, Sungkai and Bidor, and I am "now only awaiting Sakais to come in who will assist. I "send my heavy luggage on by water to Tapah on the Batang "Padang (which it is also part of my instructions to explore "to extreme Ulu) whilst I proceed round by the mountains."

In the conclusion of the above letter Mr. Cameron asked for instructions, and Sir Hugh Low stated that he thought that Mr. Cameron could not do better than complete the exploration and survey sketched out for him by Mr. Swettenham.....and then return to Taiping to plot the work and prepare a report for submission to His Excellency the Governor. (Pk. 1695/86).

* Changkat Asah is a small hill station near Tanjong Malim.

On the 31st May 1886 the Governor, Mr. (later Sir) F. A. Weld, wrote the following minute:—

> "Mr. Cameron seems to have done a deal of good work "and I shall await his detailed report and plans with interest, "but he ought not to remain at his work without rest, it is "too trying. The sooner he can devote himself to laying "down the results he has obtained, the better. Then he can "recover his health, which I regret to see is suffering. I also "want to meet him and may require him on special service."
> (2398/86).

On the 27th June 1886 Mr. Cameron sent in advance two policemen (a lance corporal and a constable) to go with the men who had accompanied him when he discovered the plateau mentioned above, to secure and cut a track to Kuala Penoh where he was to join them if they found that the proposed trace would be feasible. On the 2nd July Mr. Cameron proceeded to Batu Gajah and received information that at Kuala Penoh the approach was precipitous and inaccessible by elephants. He therefore resolved to follow his original track from Kepayang.

It would seem that His Excellency the Governor had intended to accompany Mr. Cameron on this trip, because in a letter dated the 16th April, 1886, written from Taiping, Mr. Cameron says:—

> "Lance Corporal Mat Thaib having cut our old track "as far as Kuala Talong on the Raia one of my old stations "where he erected a large pondok for the accommodation for "H. E. the Governor."

Mr. Cameron then received a reply from the Resident that the Governor would not have time to make this journey, and that he himself was to return to Taiping which he did on the 5th August.
(Pk. 3594/86).

This appears to be the result of a minute dated 3rd August 1886 by Sir Hugh Low, in which he stated that Mr. Cameron should be asked to confine himself now to mapping out his observations and drawing up a general report. This letter was sent to Mr. Cameron on the 13th August, and the letter of the 16th August appears to have been in reply to it.

On about the 16th August, 1886, he appears to have left Taiping for Singapore. On the 24th October he wrote from the General Hospital, Singapore, saying that he had hoped to leave for Taiping on that day, but had been requested to wait to see the Governor, and also the Surveyor-General, as to the future exploration of the Peninsula. He added that he had been suffering again from fever. He died in Singapore on the 9th November, 1886.

To sum up then, it would appear that the Plateau which Cameron discovered was discovered on his first expedition in 1885. Cameron returned to Taiping from this expedition on the 29th

September 1885, and the rest of the year he was dividing his time between Singapore and Taiping. His second expedition in 1886 was on the territory between Selangor and Perak, and not in the neighbourhood of the Highlands at all. The latter half of the year was spent in preparing for the visit of the Governor to the Highlands, which visit did not materialise, and in endeavouring to recover his health.

* * * * *

Hulu Slim, 9th April, 1886.

Dear Mr. Creagh.

I have just come down from the mountains of Berang, Bil and Giliting where I have been perched up 6,600 feet amidst the mists, rains and bitter cold for three months, and your kind letter of 16th ultimo has just reached me. I can assure you I was very pleased to receive it. I have first to thank you for your very kind attention to my request as to remittance, and am further glad that you have opened the subject of communicating with Sir Hugh Low as to my progress, as this has been occupying my mind for sometime, but no one appearing to take any particular interest in the matter, I have simply gone on following up my instructions, rather than trouble anyone, until I have some communication from headquarters, but I did feel a little uncomfortable at the idea of going on thus trailing thro' jungle and over mountain after mountain without the assurance that what I was doing would accord with the views of the Resident.

For your information, and in order that you may communicate with Sir Hugh Low on the subject, I will for the present (it must be very briefly, for, a full account would occupy a long report and much time) recapitulate my movements "ab initio" and I will beg you to excuse style etc as I am in great pain from hemorrhoids contracted during exposure in my recent exploration amongst the mountains.

My first exploration expedition began in February last year. My instructions were to go to Waterloo Estate thence up Bubo thence to Gunong Chabang on the Raia via Batu Gajah from Chabang, due East down with Pahang and cross south so as to come out about Hulu Bernam or Selangor.

These I followed literally opening an entirely new track across the valley of the Raia and Penoh and made a pass over into the upper valley of the Telom at fully 5,000 feet where I discovered a new and very interesting plateau of country mountains for miles an average elevation of 4,500 feet on the rivers' banks, but this is on Pahang territory. I ascended a number of mountains and took many sketches with elaborate details in the way of bearings both on Perak and Pahang country as also on the Kelantan. I came out near Hulu Mut on the Slim, then on to Bernam, thence to Sungkei and down to Telok Anson keeping up a consecutive system of

sketches and detailed bearings. I then returned to Thaiping reported myself and progress—produced sketches and plottings to Mr. Swettenham also to Mr. Caulfeild. I subsequently made out a rough plotting of portion of my survey for Mr. Caulfeild on the inch scale to compare with his map, but Mr. Swettenham was urgent that I should proceed without delay with the exploration work and subsequently the latter piece of work was abruptly cut short ere it had gone far. I however left this plotting also all my sketches with Mr. Caulfeild from whom I received the utmost kindness and attention. He said he would take care of the sketches and probably have them placed in the Treasury safe. I mention this lest he may have left on leave as I understood he intended.

Present expedition.

It was arranged with Mr. Swettenham that I should thoroughly survey the mid country between Selangor and Perak so as to join the two States accurately and with as full information and detail as practicable—this was a very important piece of work and rather an anxious one for me for I had to take up all the threads of my Selangor survey and tie them on to Perak, and this was putting a crucial test to my work. I am happy to say that I have been enabled to accomplish this with greater success than I even hoped, but it has been a more tedious and trying piece of work than I expected, I venture to think, however that Sir Hugh Low will approve the results. I have a sheaf of sketches with very elaborate bearings which I hope to have the pleasure to lay before him.

Mr. Swettenham was anxious that I should explore the unknown country at the extreme Hulus of the Slim, Sungkei and Bidor and I am now only waiting for Sakeis to come in who will assist. I send my heavy baggage on by water to Tapah on the Batang Padang (which it is also part of my instructions to explore to extreme Hulu) whilst I proceed round by the mountains.

To send a messenger, who could give any intelligible account to yourself or to Sir Hugh Low, would be impossible—there are none such here except my assistant and I would have followed up your favour of 16th instant by coming on to Thaiping myself but at this state of my journey it would be a very serious injury to the expedition, involving disorganisation and a "sea of troubles" in the matter of elephants and men whilst my arrangements are only now completed and would all have to be dropped and renewed again, but I propose to take a run across from Tapah when I will lay all my work before you.

Re accounts on my return from 1st expedition. I laid all my accounts before Mr. Swettenham who passed them in toto so far as my memory serves me in a final minute—some vouchers chiefly in Chinese were wanting but they were all in order and

will be produced. I must explain that in my arrangements with Mr. Swettenham I have always refused to have anything to do with accounts and was to have had an assistant to keep them on behalf of the Government, this however I was informed on reaching Perak was not convenient so I struggled on the best way I could with the assistance of my Chinese boy and quasi krani, but this time I have engaged an assistant at my own charges and our books are all duly written up and in order. I literally have no time for this work. I am working hard from sunrise (before it indeed) till after sunset every day without intermission. Sundays, Highdays and holidays and even with that I find it difficult to keep pace with the intelligence portion of my work. I will now however bring my assistant with me and I shall be obliged if yourself or the Treasurer will instruct him as to the precise manner in which he is to render his accountings to the Treasury so that he may accord with your wishes.

I daresay you will from your knowledge of the jungle understand, that as a rule if not invariably neither time, place nor circumstances are favourable to clerical work in an expedition of this description. I trust you will excuse this brief reply (brief for the subject matter) I cannot really sit a moment longer—pain dreadful.

Kindest regards and again thanking you,

Believe me

Yours faithfully.

*Sd.* WILLIAM CAMERON.

P. S.

I must apologise for non dating previous letter it was written sitting on ant hill, and in the hurry I must have forgotten. I see by my diary it was written on 16th February. I was in hopes to add to this if anything occurred to me before tomorrow but the Penghulu has just come in saying that the constable is waiting at Tanjong Blit for this letter to start off at once.

# The Coffin Breakers Society

*By* W. G. STIRLING.

In 1892 there existed a Society which bore the apparently harmless title of Shiu Lok Peng On 水陸平安 or "Peace on Land and Water." We are accustomed here to such phrases on red paper written in Chinese characters and stuck up over doorways or stairways. A very common one is "Seong Lok Peng On" 上落平安 literally, "In going up and coming down peace be unto you." But in 1890 Shiu Lok Peng On bore the sinister meaning of "Robbery on land and sea" and struck such terror into the hearts of the Chinese that the phrase became a byword for all that was evil. It was not just a petty society which cropped up for a short period and then disappeared, though it did not of course hold the same place as the notorious Triad Society of China with which it had no connection. A mild form of steamer thieving, much on the lines of the Shiu Lok Peng On breaks out at times, but without any of the old society's organization or power, which while it lasted left its mark on the history of Singapore, Penang and Malacca.

The Shiu Lok Peng On Society was an association banded under certain Headmen for the purpose of cheating and plundering Chinese travelling on steamers between this Colony and Hongkong. Not content with this they carried on their nefarious work in Singapore also. It is said to have been founded by a Cantonese, Kwan Fán, on the 10th moon of the 11th year of Kwong Su 1885. The objects were to commit robberies with as much safety as possible, to levy blackmail on brothels, to oppress and cheat honest people and to run a system of gambling in which fraud, trickery and sharping were the chief features. During the first few years it amassed considerable wealth.

Some time in 1887 certain of its leading members became the object of police attention in Hongkong and fled to Singapore where they lived in a lodging house (in the Kreta Ayer District) used by the agents of the Society. After remaining quiet for a few months, these men saw how advantageous it would be to open up a branch of the Society in Penang, and that with a Headman in each of the three Settlements, the field of operations would be much wider. They reorganised the Society and took a house in Almeida Street as their Club, where meetings were held at which new members were enrolled and business discussed.

It would appear that a regular register of members and account books were kept and a seal with the characters Wa Ki 華記 was cut and used on the Society's correspondence. It had no paraphernalia, ritual, flags etc. but a silver coin was cast in Hongkong after the fashion of an ordinary Chinese copper

cash bearing on it the characters "Peng On" and the number of the member in the Society's register.

Expenses were met by entrance fees, subscriptions, the extortion of a regular fee of one or more dollars from brothel keepers, and of monies paid into the common fund of the Society from the proceeds of robberies, a portion of which was remitted to the Headquarters fund in Hongkong.

In 1888 a branch was fully established in Penang where the Society's agents were employed in breaking open passengers' luggage. Penang was a convenient centre as from there the Society's agents could best ascertain what Chinese from the northern part of the Malay States were returning to China. In 1889 the Society, emboldened by success, carried on its business almost openly. A number of Chinese who had business connection in China which required constant visits to and from Singapore, joined it in order to avoid being robbed and cheated. Business correspondence was kept up between the three Settlements and funds were distributed as required. In 1890 the founder Kwan Fan found himself in trouble in Hongkong and was compelled to leave. He came to Singapore and stayed for a few months, but left for French Indo-China and was not heard of again, as far as I am aware. This man was without doubt the master brain of the Society. After he left Hongkong the Society became disorganised. At the end of that year, the two principal Headmen in Penang fell into the hands of the Chinese Protectorate and were banished. The members of the Society left Penang and turned their attention to Singapore, where they were joined by members from Hongkong who after the arrest of their leader were afraid to remain and operate there. Later the Chinese Protectorate laid its hand on certain other members, after which the operations of the Society were carried on with greater care. Meetings were secret, and held only at certain periods at some private house.

The total number of resident members and those who worked the steamers was estimated at roughly 400 people. Some were always engaged in steamer thieving or what was better known as PAU KUN TSOI "breaking open coffins," on account of the coffin-like shaped pillow box which many Chinese possess. Others were engaged in cheating and confidence tricks known as WAT CHUK I; others in thieving and crooked gambling, extortion etc. One gang acted as informers and went about ascertaining as far as possible news of any rich people likely to be going to China.

Members were required to pay 10% of their takings to the funds of the Society, which were used to defray the expense of engaging lawyers when a member was arrested; part was used as capital to run the illegal gaming and part to buy evidence when it was required. The Headmen got $10 a month as salary and only old and trusted members were entrusted to carry the funds about. Expenses were heavy. The Society usually paid $10 as

a gift on the marriage or funeral of any of its members and they had two feast days held on the 19th day of the 1st and 5th moons.

Before a member was allowed to join, his name was posted up for one month in the Club. This was done to see if he was the right sort of man and not an informer. For it was necessary for the existence of the Society that only "safe" men should be elected. Many ships' hands were members and assisted their confederates in stowing away or hiding the proceeds of their robberies. It was a strict rule of the Society, that on pain of expulsion no incriminating property such as clothing was ever to be taken but only gold and silver ornaments, watches, rings and money. After being rifled the box and all its contents had to be thrown overboard to destroy all traces of the crime. It was doubtless due to this precaution that hardly any of the robberies were detected. Each member had to dispose of the proceeds of his robbery himself and he was to do this in a different place to where the robbery was committed. There was always more than one robber on a ship, in case the owner of the stolen property let other people know how much was lost and its value, so that if the thief did not give a correct account of his takings and pay the proper commission to Headquarters, he would render himself liable to expulsion from the Society and probably other penalties. After a robbery the coffin breaker had to hide the property with the connivance of the cook or one of the ship's hands, and on arrival at the port of destination was to take it to a regular house receiving stolen property where it was almost at once melted down. So skilfully were these robberies carried out that no evidence was forthcoming, and with the assistance of the steamer's employees detection was almost impossible. The compradores of the steamers who were in charge of the native passengers were afraid to give information for fear of retaliation and blackmail. The best time for robbing passengers was during the monsoon, when they were sea-sick. These crimes committed as they were on the High Seas were out of the control of the Police. Some "coffin breakers" waited until the steamer was about to sail and then went aboard without a ticket and hid until the ticket collector had been around, the cooks and boys being nearly always afraid to report against them.

The Society was feared and hated by the Chinese in the Straits Settlements. For want of efficient evidence it throve in Singapore for six years, committing daring robberies, cheating and gambling with impunity both on land and at sea.

The entrance fee in Singapore was $5 and in Penang $6.20 of which $2 was sent to Hongkong as commission. Every member who bought a girl in China and brought her down here in order to sell her for prostitution had to pay $6, $4 of which was remitted to Hongkong; and when a girl was bought a letter was sent informing members, in order that they should get their fee. Whenever the Society attended weddings or funerals, the only

outward sign was lanterns on which were written the characters Wa Ki.

The work of the Headmen was chiefly harbouring and protecting the active criminal agents, raising money by blackmail, bailing those who had been arrested, engaging counsel, forming plans for robberies, organizing illegal gaming, collecting information about the movements of well-to-do people, buying evidence, dealing with offending members, paying out shares derived from the sale of stolen property. The Headmen were dangerous members of the community and encouraged the active members to run greater risks. When individual arrests were made the person robbed was afraid to come forward in Court for fear of retaliation.

To break up the Society it was necessary to arrest as many of the Headmen and prominent suspects as possible for fear they should shift their headquarters to Johore, or Malacca. Most of the notorious members were known to the Cantonese community in Singapore but for reasons stated it was extremely difficult to take action against them; but if robbers were harassed and persecuted as far as possible from residing in the Colony, their means of livelihood would become precarious and the Society eventually come to an end. Few of the members resided in either of the three Colonies for long. They kept on the move, but whenever opportunity offered, arrests were made. The late Mr. G. T. Hare, after patiently waiting and collecting evidence, slowly but surely spread his net, and the Society found its actions seriously incommoded till finally it fell into the hands of the Chinese Protectorate. So bad was the "Shiu Lok Peng On" that Government issued a proclamation calling on the public to render assistance and expressing the determination to bring the Society to an end; Government was aware that several members were still at large and requested the aid of all law abiding citizens to capture them. The proclamation ended by giving a list of the thieves who were still wanted.

The Society is well remembered in Singapore even today which shows the notoriety it achieved.

It had some slang terms some of which were as follows:—

| | |
|---|---|
| to go on board a steamer | *lau pin* |
| to steal money | *loh fah* |
| $1, $10, $100 | *yat ki, yat tsün, yat chek* |
| a watch | *kun lun* |
| a gold watch chain | *wong mang li* |
| a gilded watch chain | *chi kung mang li* |
| a ring | *wo lo* |
| to throw overboard | *si lok tai thai* |
| to pickpocket | *a pau ko* |
| snatching ear-rings from a woman | *a po a seng* |
| man pushed overboard | *yeong ku* |
| to drug a person | *lok sap* |

# A Note on the North and South Points of the Compass in Kedah and Trengganu

*By* J. L. HUMPHREYS.

In a paper called *Points of the Compass in Kedah*, which appeared in No. 86 of the Journal (November, 1922), Mr. A. W. Hamilton offered an explanation of certain terms used by inland Malays of Kedah for describing the South and North points of the compass.

The terms are:

South, *Kepala tidor* (head-in-sleep),

North, *Kaki tidor* (feet-in-sleep).

Mr. Hamilton's explanation is as follows:

"The curious local expressions *Kepala tidor* and *Kaki tidor* appear to have arisen from the invariable orientation of Siamese houses, which are built with the axis East and West, the entrance facing the rising sun.

The occupants when lying down for the night in their rather narrow dwellings are thus constrained to lie across the house with heads to the wall and feet to the centre, so that all the heads in a village will be pointing one way (*Kepala* tidor, or South), and all the feet another (*Kaki tidor,* or North.)"

Mr. Hamilton's explanation is, I think, on the face of it untenable; and an inspection of houses inhabited by Siamese in North Kedah has satisfied me that neither is there any rigid rule for the orientation of the houses (they lie in every direction and conform to the bend of every path), nor is there anything in their structure to enforce a physical uniformity of sleeping posture. The smallest house examined had a floor-space of twelve feet by eight.

These curious terms, head-in-sleep for South and feet-in-sleep for North, are as common in Trengganu, where there is no trace of Siamese influence, as in Kedah. Their origin in Trengganu is as follows.

A Muhammadan corpse is placed in the grave on its back with head to North and feet to South, and with the face turned, according to the Kiblah, in the direction of the Ka'bah (Baitu'llah) at Mecca. Trengganu Malays for sleeping adopt the reverse position, with head to South and feet to North, and the regularity of this custom has provided terms of the North and South points and 'sun-setting' (*mata-hari naik, mata-hari jatoh*) that serve for East and West.

The reason why a Malay adopts for sleeping a position the reverse to that which he will be placed in as a corpse is probably a piece of primitive folk-lore, far beyond mere distaste for a position with a proleptic graveyard significance. There is little doubt that the custom is a survival of taboo, a negative application of the 'homoeopathic' magic that underlies all such customs of abstention or rules of avoidance.

Sir J. G. Frazer in Part 2 of "The Golden Bough" (Taboo and the Perils of the Soul) explores this subject with a wonderful wealth of illustration. A short summary of the argument is as follows:

The underlying belief of practical primitive Magic is a belief in 'the infectiousness of personal acts or states'—the belief that like produces like and *vice versa*. And just as sorcery (or positive magic) aims at producing a desired result, so taboo (or negative magic) aims at avoiding an undesirable one. Both act on the principles of homoeopathy. The rude hunter or fisherman imitates the result that he seeks to attain, and avoids things that bear a resemblance to what would be disastrous.

As examples of positive sorcery. A Malay who has baited a trap for crocodiles and is awaiting results is careful in eating his curry to begin by swallowing three lumps of rice successively; this helps the bait to slide more easily down the crocodile's throat.

Again, when the Haida Indians of the Queen Charlotte Islands go to war, the women left at home lie for ten nights with their heads towards the point of the compass to which the war-canoes have paddled away. Then they change about, for the warriors are supposed to be coming home across the sea, and the sleeping attitude of the women will speed their return by the influence of sympathetic magic.

As examples of taboo. Esquimaux boys are forbidden to play cat's cradle: if they did so their fingers might in later life become entangled in the harpoon-line.

Again, Malays in search of camphor eat their food dry and take care not to pound their salt fine. The reason is that the camphor occurs in the form of small grains deposited in the cracks of the trunk of the camphor tree. Accordingly it seems plain to the Malay that if while seeking for camphor he were to eat his salt finely ground the camphor would be found also in fine grains; whereas by eating his salt coarse he ensures that the grains of the camphor will also be large.

In all these instances, both of sorcery and taboo, the underlying principle is the supposed law of similarity, the basis of homoeopathic magic. There can be little doubt that the origin of head-to-South and feet-to-North in sleep is based on the same primitive superstition both in Trengganu and Kedah—the desire to avoid what suggests, and so may hasten, the burial of a corpse.

With this superstition it is interesting to compare and contrast the antipodean beliefs of Chinese, who seek to procure long life in an aged parent by a present of grave-clothes, known as 'longevity garments', cut and sewn by a young girl, made in a year with an intercalary month, and embroidered with the word 'longevity.' The happy owner wears these grave-clothes on festive occasions, particularly on his birthday, absorbing the youth of the maker, the virtue of the lengthened year, and the influence of the embroidered word, and cheating the fates by the disguise of the premature death raiment.

A word may be added on the use in Trengganu of the four ordinary Malay terms for the points of the compass—*utara, selatan, timor, barat.*

*Utara* (a Sanskrit word) is hardly ever heard; it is occasionally used for North-east, especially in connection with the North-east Monsoon.

*Selatan* (derived from Selat, meaning the Straits of Singapore) is never heard in the sense of South. But Singapore itself is commonly referred to as Selat.

*Timor* is not used in the strict sense of East; it nearly always refers to Pahang and Johor, the States that lie to the South and South-east, and even to the Federated Malay States (that lie partly *due West* of Trengganu).

*Negri sa-blah timor* means in Trengganu those parts of the Peninsula that are reached by a voyage starting South-east.

*Barat,* similarly, is almost always used with reference to the Malay States of the Peninsula reached by a voyage that starts North-west, in Kelantan and Patani.

So little have the terms *Timor* and *Barat* the strict sense of cardinal points, and so greatly a local and regional meaning, that it is not uncommon in old Trengganu documents to see the four boundaries of land described as:

*Sa-blah mata-hari naik*....on the sunrise side....
*Sa-blah mata-hari jatoh*....on the sunset side....
*Sa-blah Timor*....on the East (meaning Pahang) side..
*Sa-blah Barat*....on the West (meaning Kelantan) side.
*Timor* connoting to all intents and purposes, South, and *Barat* North!

It may be added that *Barat* has acquired a secondary significance. Strangers from Kelantan and Patani have an unpleasant reputation in Trengganu; the men are usually bad characters and thieves, the women of easy virtue.

When in 1924 the Northern districts of Trengganu were united under a State Commissioner, the proposed title *Pesuroh Jaya Barat* (State Commissioner West) was objected to by the Officer concerned as liable to connote Commissionership of thieves and whores; and the title *Pesuroh Jaya Jajahan Barat* (State Commissioner of Western Districts) was substituted.

# Malay Love Charms

*Recorded and translated by*

A. W. Hamilton.

**A Charm to be recited by women for the purpose of obtaining sweet and winning looks.**

PĔMANIS MUKA.

1. Puchok kandis, daun kandis,
Tanam mari pĕrigi batu,
Dudok manis, bĕrdiri manis,
Manis sĕgala ummat Muhammad mĕmandang aku,
Sĕri naik ka tuboh,
Chahya naik ka muka ku,
Chahya Allah, chahya Muhammad, chahya baginda rasul Allah.

Kandis bud and Kandis leaf,
Planted by a well of stone;
Sweet when seated, sweet erect,
May folk find me sweet alone.
May my person radiant be,
Features all afire,
With light of God and Muhammad,
God's Prophet; Loved sire.

**A Charm to be recited when combing the hair to ensure good Looks.**

SIKAT.

2. Sikat, sikat tandok,
Sikat tĕngah hari,
Muka aku bagai bintang mabok,
Bagai chahya bidadari.

Comb, with comb of horn,
Comb at height of noon;
May the stars reel at the sight
Of my heavenly face's light.

**A Charm to be recited when oiling the hair in order to attract the youth of one's fancy.**

MINYAK KĔPALA.

3. Lang borek, lang kĕlabu,
Lang hitam bĕrtali rantai,
Mudek, hilir, mĕnchari aku,
Kĕna doa gantong gĕragai, (si anu itu)
Bĕrkat doa la-illaha.

Spotted hawk and hawk of ash,
Hawk of black on iron leash,
Search for me upstream; Search for me down.
You who are caught with this dangling charm,
By the grace of prayer.

**A Charm for holding one's love spellbound to be repeated when bathing, gazing at the moon the while.**

MANDI KUNDANG BULAN.

4. Limau manis, siambang bulan
Sĕlaseh tumboh di batu.
Dudok mĕnangis mandang bulan,
Tundok kaseh kapada aku.
Salang gajah kaki ĕmpat
Salang tundok kaseh sayang kapada aku
Ini pula macham (si anu itu)

Sweet limes in the moonlight,
Basil on the rocks;
Tearful gazer at the moon,
Lovelorn be thy looks.
Elephants whose feet are four,
Even they my looks adore,
Yóu, Oh Stranger, how much more.

**A Charm to direct the full tide of a man's love towards oneself and his hatred towards all others.**

MĔNGASEH BĔRIKAT DĔNGAN PEMBENCHI

5. Ayer bĕrpusing di atas batu
Chedok dĕngan kulit lokan
Kaseh bĕrpusing kapada aku
Bĕnchi bĕrkisar kapada (si anu itu)
Bukan aku punya kisar
Kisar Daud, kisar Sĕleman
Allah yang musing, Muhammad yang mĕmaling
Bĕrkat doa la-illaha.

Water swirling over stone,
Scoop it up with mussel shell;
Your love turn to me alone,
Hate towards the other girl.
This is not my turning craft
Solomon and David's work;
God twists and Muhammad turns,
Through this prayer the blessing comes.

**A Charm to induce a state of lovelornness in one's beloved by means of a cigarette.**

HIKMAT DALAM ROKOK.

6. Tĕmbakau si raja Ali
Rĕndang kuali sudu
Aku pintal ĕngkau sĕpĕrti tali
Aku mĕmakai kasehan rindu
Tĕrindu rindukan aku
Tĕrendang rendangkan aku
Tidor siang tĕrlihat lihatkan aku
Tidor malam tĕrmimpi mimpikan aku
Bĕrkat aku mĕmakai kasehan rindu
Bĕrkat doa la-illaha.

This is Raja Ali's leaf,
Warm it in an iron pan;
I will twine you past belief,
For I use the lover's plan.
Think of me in your day dreams bright;
Think of me in your dreams at night;
For I use the spell of a lover's plight,
And your blessing divine, O God of might; my Prayer.

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# Two Malay Tales

*Recorded and translated by*

H. E. Savage.

(Both of these Malay tales were taken down as they were told to me by Che' Embong binti Pak Chik, of Kuala Han, Kelantan. The "Tale of the Croton" I obtained in February 1924, and the "Story of Raja Tasek" in July 1924).

## The Story of Raja Tasek.

The seven daughters of a raja expressed their wishes to marry:—the first, the stable-lad; the second, the cow-herd; the third, the buffalo-herd; the fourth, the shepherd; the fifth, the goat-herd, and the sixth, the kennel-man. The seventh, and youngest said she wished to marry the Raja Tasek.

This made her sisters very angry and jealous, and they carried tales about her to their father. He ordered the young princess to be taken away and left in the jungle.

For seven days the unhappy girl wandered weeping, until she came to a banana plantation owned by an old woman named Mek Tor.

Mek Tor adopted the princess, and told her that the country was called "Tasek," and that Raja Tasek lived just behind a distant hill.

The princess made a bouquet of flowers and asked Mek Tor to take them to Raja Tasek's palace. The Queen-Mother bought the flowers and put them in her son's own room.

Raja Tasek would not believe that Mek Tor herself had put together such a handsome bouquet and ordered her to come and make one from the flowers in the palace gardens.

The old lady became very frightened, but the princess soothed her by saying that she would give her a talisman that would not fail her. This proved to be a "blue-bottle" fly, and whenever it alighted upon a flower, Mek Tor added that one to the bouquet, which eventually she gave to Raja Tasek.

Some time later a messenger came to Mek Tor and said that Raja Tasek was snaring birds in the district and wished to rest for a while at Mek Tor's house.

The old lady tried to dissuade him from doing so, but Raja Tasek insisted upon coming. Mek Tor would have run away until the Raja had left the district, but the princess said that there was nothing to worry about if they made the place as tidy and clean as possible.

The night before Raja Tasek's arrival there were noises like thunder, and in the morning Mek Tor's house had become a most magnificent palace in which nearly everything was of gold or silver and her clothes were most beautiful.

When Raja Tasek arrived the princess concealed herself within a roll of matting behind a door.[1]

The Raja was astonished when he saw such wealth and was annoyed that his messenger should have misled him. He took a fancy to the roll of matting and declining all other more expensive presents carried it back to his palace.

When he opened it in his own room, the princess stepped out; beautiful beyond compare.

Raja Tasek's heart trembled and he almost fainted. "My wife!" he said. "My husband!" whispered the princess.

In due course they were married with much pomp and display, a fabulous amount of money being spent.

### How the Croton came to Malaya.

Jainab, a foreign king's secondary wife, being jealous of Zulaikha, the principal wife, pushed her into a river, intending to drown her. Zulaikha, however, turned into a fish.

1. Cf. the story of Cleopatra and Caesar.

When Jainab found Jariah, Zulaikha's daughter, talking to the fish, she caught and ate it. Jariah managed to get one of the bones.

Next day she planted it, and very soon a lime tree sprang from it. This she tended, watering its roots in dry weather; and the tree spoke to her even as the fish had done.

When Jainab found that Jariah's mother existed in the form of the tree she cut it down and burned it, but not before Jariah had managed to obtain one of the seeds of its lime-fruit.

Some time afterwards Jariah ran away and planted the seed in the heart of the virgin jungle. A plant quickly grew from it; not a lime tree, but a croton.

Jariah had no difficulty in finding food, and her clothing neither wore out nor tore because the spirit of her mother was watching over her.

One day a Malay Raja, Abdul Shah, while hunting in the forest discovered Jariah. She told him how she came to be there, and pointing to the (by now full-grown) tree said "This is my mother; now in the form of a tree."

Raja Abdul Shah fell deeply in love with Jariah, and took her away with him, back to Malaya. The croton also he took and planted in his own garden.

All those who saw the tree were greatly astonished at its beauty and asked where it came from and why its leaves were so variegated.

Jariah told Abdul Shah that it had no name, since it was the only one of its kind, and was in reality her mother. The gold in the leaves, said she, came from her mother's skin, which was fair and beautiful. The red represented her blood, and the green the colour of the deep water of the river into which Jainab had pushed Zulaikha.

In this way Jariah gave suitable explanations for all the colours and patterns of the croton leaves.

Then Raja Abdul Shah called his magician and ordered him to restore Zulaikha to life. The magician told Abdul Shah to cut off a branch of the croton and to immerse it in a concoction that he gave him.

When Raja Abdul Shah did this the vessel containing the concoction burst into fragments, and Zulaikha stood before him to the great joy of Jariah and all present.

Some time afterwards, Jariah and Abdul Shah were married. Jariah's father gave Jainab to her as her slave after cutting off one of her arms, a foot, an ear and a nostril, and blinding her in one eye.

The croton continued to flourish and its seedlings were abundant, and at the present day it is known as the "pokok puding."

## Cherita Raja Tasek

Bahwa ada-lah kapada zaman dahulu kala, suatu raja yang maha bĕsar, Maka dia bĕr-istĕri sa-orang dan bĕranak tujoh orang pĕrĕmpuan. Maka kapada suatu hari datang putĕri bĕrtujoh itu kapada bonda-nya, mĕminta-kan bĕrmain-main di-taman; maka di-suroh oleh bonda-nya mĕminta-kan kapada ayahanda-nya.

Maka, putĕri bĕrtujoh itu pun mĕnghadap-kan ayahanda-nya didalam astana, mĕngata-kan kĕhĕndak-nya. Maka raja itu panggil-lah tujoh dayang, dĕngan sa-orang pĕngasoh yang bĕrnama "Mak Bonak," di-suroh-nya mĕnjaga-kan anakanda-nya sĕmĕn tara dia bĕrmain.

Shahdan, sampai-lah putĕri itu kapada taman, masok bĕrmain dĕkat kolam. Maka yang tua mĕngajak-kan adek-nya mĕmandi di-ambil-nya sa-orang satu chebok mĕmbawa dudok di-tĕpi kolam itu, lalu mandi. Maka putĕri yang tua itu buang-kan batil-nya kadalam ayer, maka bunyi-lah batil itu di-kĕna ayer. Kapada masa putĕri itu dĕngar bunyi chĕmpĕlong itu, ia mĕlatah mĕngata-kan, "Chokek Mak Bonak! Sahaya hĕndak bĕrnikah gĕmbala kuda."

Bahwa, putĕri yang kĕdua itu pun buang-kan chebok-nya kadalam ayer hĕndak mandi. Maka di-dĕngar-lah bunyi chebok itu kĕna-kan ayer, mĕlatah-lah dia mĕngata-kan, "Chokek Mak Bonak! Sahaya hĕndak bĕrnikah gĕmbala lĕmbu."

Maka dĕmikian itu putĕri yang lain, kapada masa dia dĕngar batil-nya chĕmpĕlong kadalam ayer, mĕlatah-lah dia. Yang kĕtiga mĕngata-kan "Chokek Mak Bonak! Sahaya hĕndak bĕrnikah gĕmbala kĕrbau"; dan yang kĕ'ĕmpat hĕndak bĕrnikah gĕmbala biri-biri; dan yang kĕlima hĕndak bĕrnikah gĕmbala kambing; dan yang kĕ'ĕnam hĕndak bĕrnikah gĕmbala anjing.

Maka yang kĕtujoh mĕngata-kan "Sahaya hĕndak bĕrnikah Raja Tasek." Shahdan, di-dĕngar oleh kakak-nya pĕrkata'an putĕri yang bongsu itu, maka marah-lah dia sĕmua, mĕngata-kan" Chĕlaka budak bongsu ini! Yang hĕndak mĕnjadi lĕbeh bĕsar daripada kami, dan yang tidak hĕndak bĕrdiam didalam nĕgĕri-nya, tĕtapi hĕndak pĕrgi kapada nĕgĕri yang dagang itu kami nanti khabar-kan ayahanda-mu."

Maka dia sakalian balek ka-astana, masok mĕngadap-kan ayahanda-nya, mĕngkhabar-kan hal itu sĕmua-nya. Maka jatoh-lah murka Raja itu ka'atas anak bongsu-nya, di-suroh-nya dua orang mĕmbawa putĕri itu mĕmbuang-kan-nya kadalam hutan.

Hatta, maka sampai tujoh hari mĕlabang-lah putĕri itu, kĕluar hutan masok padang, lĕpas padang masok hutan, dĕngan sangat susahhati-nya, tiada bĕrhĕnti daripada tangis-mĕnangis atau mĕratap-ratap.

Maka kapada suatu hari, tiba-lah dia dĕngan Kĕbun Pokok Pisang yang dipunya-i oleh satu orang pĕrĕmpuan yang tua, nama-nya "Mek Tor." Maka putĕri pun masok kĕbun itu lalu tidor.

Shahdan, orang tua itu di-rasa-i badan-nya tidak sĕnang, tĕtapi panas sahaja; tidor pun tidak buleh. Maka kata-kan-nya didalam hati-nya, "Bagaimana badan-ku panas sĕpĕrti ini? tidor tidak buleh, dan jika aku mandi, ayer itu tidak basah-kan badan-ku? Dan tidak buleh aku dudok dalam rumah-ku? Tĕtapi turun kabawah sahaja, karĕna panas sangat badan ku?". Maka ia pĕrgi pĕreksa pokok-nya, hĕndak mĕnengok buah yang masak; maka dĕngar-lah dia bunyi budak mĕnangis.

Sa-bĕntar lagi tĕmu-lah dia dĕngan putĕri itu, bĕrdudok mĕratap sahaja di-bawah pokok pisang. Maka mĕngata-kan orang tua itu kapada putĕri "Anak chuchu-ku datang darimana?" Maka di-chĕrita-kan oleh putĕri kapada Mek Tor itu, sĕmua hal-ahwal-nya.

Maka Mek Tor pulang ka-rumah dĕngan putĕri itu, mĕmba-soh-kan badan-nya, dan mĕmbĕri pakaian dan makanan kapada-nya. Maka Mek Tor pun fikir didalam hati-nya "Patut lah! Aku pun hati susah dan badan tidak bĕr-rasa sĕnang, sĕkarang tĕlah dapat anak-chuchu, buleh mĕnjadi sĕnang sĕdikit." Tĕlah mandi dan makan, maka di-tanya-kan oleh budak itu," Apa nama nĕgĕri ini, dan Raja-nya sĕmayam di-mana?" Maka jawab Mek Tor, "Nĕgĕri ini, nĕgĕri Tasek, dan-astana Raja Tasek ada di-balek bukit itu." Lagi putĕri itu bĕrtanya" Adakah pokok bunga dĕkat rumah ini? "Maka jawab Mek Tor, "Ada-lah."

Arakian, maka putĕri itu pun pĕtek bunga bĕrjĕnis-jĕnis, mĕmbuat-kan sa-ikat bunga, di-suroh-nya Mek Tor mĕmbawa bunga itu pĕrgi ka-astana Raja Tasek hĕndak mĕnjual-kan-nya. Maka kapada esok hari-nya, Mek Tor pun bĕrjalan kaki pĕrgi ka-astana Raja Tasek.

Sa-tĕlah ia sampai, maka ia mĕngajak-kan pĕrmaisuri tua mĕmbĕli bunga-nya. Maka pĕrmaisuri itu pun bĕli-kan bunga itu, lalu bawa masok kadalam bilek Raja Tasek. Maka di-tanya-kan oleh Raja Tasek "Siapa mĕngikat-kan bunga ini? Pandai amat buatan-nya, dan elok molek-rupa-nya." Maka jawab-lah Mek Tor "Patek sĕndiri bikin, Tuanku." Maka Raja Tasek tiada-lah pĕr-chaya akan dia, kata-nya "Bohong! Kamu tiada pandai mĕmbuat pĕngikat bunga molek bagini." Maka Mek Tor pun ulang-kan perkata'an-nya, mĕngata-kan "Patek sĕndiri bikin, Tuanku."

Hatta, maka Raja Tasek mĕngata-kan "Baik-lah! Esok kamu mari sini mĕmbuat sa'ikat bunga daripada bunga-bunga yang ada didalam taman kita."

Shahdan, pulang orang tua itu kapada rumah-nya. Tĕlah sampai kabawah tangga rumah, maka ia mĕnangis, karĕna sangat susah hati, takut kĕna murka Raja Tasek. Maka putĕri itu bĕrtan-ya "Kĕnapa nenek-ku mĕnangis?" Maka Mek Tor khabar-kan

hal susah itu. Maka putĕri itu mĕngata-kan kapada-nya "Jangan nenek-ku susah hati lagi; esok aku bĕri-kan satu tangkal buleh nenek-ku pĕrgi ka-astana dĕngan sĕnang hati."

Bahwa, kepada esok nya di-bĕri-kan oleh putĕri kapada Mek Tor satu lalat hijau di-kata-kan "Apa-bila nenek-ku hĕndak mĕngikat bunga itu, pileh-lah bunga yang di-hinggap oleh lalat hijau ini. Dan lagi, jangan-lah lalat ini kĕna mati."

Maka Mek Tor pĕrgi ka-astana, mĕmbawa lalat hijau itu.

Sa-tĕlah sampai maka masok-lah ia kadalam bilek pĕrmaisuri tua itu, lalu mĕngikat bunga. Maka di ambil-nya bunga itu yang di-hinggap oleh lalat hijau sahaja.

Maka pĕrmaisuri itu tampak-lah lalat itu tĕrbang ka-sini ka-sana, dia hĕndak mĕnangkap mĕmbunoh-kan-nya, tĕtapi tiada-lah jadi.

Maka Mek Tor bĕrbuat bunga sa-ikat yang sangat molek, di-bĕri-kan kapada Raja Tasek, lalu pulang ka-rumah nya.

Arakian, kapada suatu hari Raja Tasek mĕngata-kan kapada-nya "Sahaya hĕndak pĕrgi mĕmikat burong, barang kali tujoh hari baharu sahaya balek." Maka Raja Tasek pun jalan-lah, di-hampir-kan rumah Mek Tor. Maka ia hantar sa-orang biduanda pĕrgi ka-rumah Mek Tor, mĕmbawa khabar Raja Tasek hĕndak singgah ka-rumah-nya didalam lagi tiga hari.

Sa-tĕlah di-dĕngar khabaran itu maka jawab-lah Mek Tor "Tidak patut tuanku datang ka-sini; rumah-ku hina miskin sahaja, lagi kotor. Balek-lah kamu mĕminta-kan tuanku jangan-lah singgah ka-sini."

Maka Raja Tasek pun hantar orang lain mĕngata-kan "Tidak apa kita hĕndak singgah juga." Maka Mek Tor takut sangat, karĕna Raja Tasek hĕndak datang, kata-kan dia kapada putĕri, "Mari-lah chuchu-ku! Kita lari masok hutan, nanti Raja Tasek sudah lĕpas balek."

Bahwa, maka putĕri itu pun sĕjukkan hati Mek Tor itu, Mĕngata-kan "Jangan-lah takut nenek-ku, nanti kita bĕrsiap-siap rumah ini dahulu, buleh mĕnjadi bĕrseh dan chĕrmat."

Kapada waktu itu, tinggal satu hari sahaja daripada kĕdatangan Raja Tasek. Maka pada malam itu mĕngata-kan putĕri kapada Mek Tor, "Jikalu nenek-ku dĕngar bunyi malam ini sĕpĕrti bĕdil mĕlĕtup, jangan-lah pĕduli karĕna tiada apa-apa. Satĕlah sampai tĕngah malam, maka Mek Tor dĕngar gĕmpar sĕpĕrti bĕdil mĕlĕtup, tĕtapi dia tidak pĕduli karĕna ia ingat pĕrkata'an putĕri itu. Arakian, tĕlah sampai pagi, maka hairan-lah Mek Tor mĕnengok rumah-nya tĕlah jadi sĕpĕrti astana yang amat kaya, pĕrkakasan-nya sĕmua-nya daripada mas dan perak dan sa-bagai-nya, dan pakaian Mek Tor pun tĕlah mĕnjadi endah-endah rupa-nya

Shahdan, kapada masa itu, Raja Tasek pun datang, maka putĕri itu sĕmbunyi-kan diri-nya didalam sa-gulong tikar yang di-bĕlakang pintu rumah itu. Maka hairan-lah Raja Tasek mĕnengok-kan pĕri-hal rumah Mek Tor itu, lalu mĕngata-kan nya "Orang kita tipu sahaja, katakan dia 'Rumah Mek Tor itu sĕpĕrti sangkar ayam,' tĕtapi rumah ini lĕbeh endah daripada astana kita." Lagi di-tanya-kan "Mek Tor sa-orang sahaja dudok sini?" Maka jawab Mek Tor "Patek sa-orang tuanku." Maka ia mĕngajak-kan Raja Tasek masok dudok sa-bĕntar Maka masok-lah Raja Tasek ka-dalam rumah itu.

Shahdan, tĕlah dudok sa-kĕjap maka Raja Tasek menengok-kan tikar itu di-bĕlakang pintu, maka mĕngata-kan-nya. "Tikar itu mĕnjadi apa?" Maka jawab-lah Mek Tor," Tidak mĕnjadi apa-apa tuanku, patek mĕnaroh sahaja." Maka mĕngata-kan Raja Tasek, "Jikalau buleh bĕri-kan itu kapada kita, sangat-lah kasehan kita kapada Mek Tor. Maka jawab-lah Mek Tor "Tikar itu tiada baik mĕnjadi hadiah yang patut di-bĕri-kan kapada Raja; baik patek bĕri-kan barang lain yang endah-endah. "Tĕtapi Raja Tasek kata-kan "Tikar itu sahaja kita hĕndak." Maka Mek Tor pun jawab "Baik lah tuanku." Maka Raja Tasek pun pulang ka-astana-nya sama bawa tikar sa-gulong itu.

Bahwa, tĕlah sampai kadalam bilek-nya, di-buka-nya tikar itu; maka kĕluar-lah putĕri itu, maka tĕrlalu amat molek-nya, tiada tĕrlawan ka-elokan-nya. Hatta, maka tĕlah tengok oleh Raja Tasek putĕri itu, gĕlĕtar-lah hati-nya sĕpĕrti hilang nyawa, maka mĕngata-kan dia "Allah! Istĕri-ku." Dan puteri itu pun mĕngata-kan "Suami-ku!"

Shahdan bĕbĕrapa lama-nya di-nikahkan putĕri itu dĕngan Raja Tasek. Maka sangat endah kawin-mawin-nya, bĕbĕrapa laksa wang tĕrhabis bĕlanja, tiada dapat kira-nya. Tamat.

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## Cherita Daripada Asal Pokok Puding Didalam Negeri Melayu

Sa-kali-pĕrsĕtua kapada zaman dahulu kala ada-lah sa'orang raja yang mĕraja-i nĕgĕri yang dagang. Maka raja itu bĕrpĕrang didalam nĕgĕri lain yang jauh.

Maka tinggal-lah istĕri dan gundek raja itu dua orang nama istĕri-nya "Zulaika" dan nama gundek-nya "Jainab." Maka Jainab itu pun jahat lagi bĕbal.

Shahdan istĕri raja itu bĕranak sa'orang pĕrĕmpuan tĕrlalu baik paras-nya, dan mĕrdu suara-nya. Maka chĕmburu-lah Jainab oleh budak itu. Ada pun kapada suatu hari istĕri itu turun ka-sungai hĕndak mĕmandi-kan diri-nya. Maka datang-lah Jainab pĕrlahan-pĕrlahan dari di-bĕlakang mata Zulaika, tiba-tiba di-sugun-

lah Zulaika oleh Jainab ka-dalam sungai di-tĕmpat yang dalam lagi dĕras ayer-nya. Maka Zulaika pun mati tĕnggĕlam di-dalam ayer.

Maka ka-pada esok hari-nya, datang-lah anak Zulaika bĕrmain-main dĕkat sungai maka nama budak itu pun "Jariah." Maka tampak-lah Jariah sa'ekor ikan yang elok sakali: maka Jariah pandang ikan itu bĕrjalan ka-sana ka-mari dĕkat tĕbing. Sa-tĕlah pandang sa-bĕntar, maka hairan-lah budak itu mĕnĕngar suara ikan bĕrchakap mĕngatakan "Hai, kĕkaseh! Mana ĕmak ĕngkau" Maka bĕrjawab-lah budak. "Tidak sahaya tahu, barang-kali dia pĕrgi mĕngadap kakak-nya. Sudah satu hari tidak sahaya bĕrjumpa dĕgan dia." Maka kata ikan itu "Hai, sĕmangat! Dĕngar baik-baik pĕrkata'an sahaya. Sa-malam ĕmak ĕngkau turun mĕmandi, maka datang-lah Jainab mĕmbunoh ĕmak ĕngkau tĕnggĕlam di-dalam ayer sungai ini. Maka ĕmak ĕngkau mĕnjadi ikan, sunggoh-lah ikan itu aku ini. Harap-lah anak-ku sa-hari-hari mĕndatang ka-sini hĕndak bĕrchakap dĕngan aku."

Tĕlah di-dĕngar oleh Jariah pĕrkata'an ikan itu, maka mĕratap-lah dia maka dia pun bĕrjanji mĕndatang sa-hari-hari ka-sungai.

Bahwa, kapada suatu hari, ikan itu mĕngatakan kapada Jariah "Hai, anak-ku! Jikalau Jainab nampak ĕngkau bĕrchakap dĕngan aku, nĕschaya-lah ia tangkap aku. Lagi, jikalau di-tangkap-i aku oleh dia, anak-ku hĕndak mĕngambil tulang sahaya satu sahaja, hĕndak tanam di-dalam tanah."

Maka kapada suatu hari, Jainab pun bĕrjumpa dĕngan Jariah dĕkat sungai, dĕngar ia bĕrchakap dĕngan ikan. Maka di-tangkap-nya ikan itu oleh Jainab hĕndak makan itu. Maka Jariah ambil-lah tulang ikan itu satu sahaja, lalu sĕmbunyi-kan itu. Kapada esok hari-nya tĕr-tanam sĕpĕrti pĕrkata'an ĕmak-nya; sĕgĕra-lah tulang itu mĕnjadi pokok limau yang bĕrbuah limau sa-butir sahaja. Maka budak itu mĕnjaga pokok itu, jikalau tiada hujan di-bĕri-nya ayer di-umbi-nya. Shahdan, kapada suatu hari, pokok itu pun bĕrchakap kapada Jariah mĕngatakan "Hai, anak-ku! Sunggoh-lah aku ĕmak ĕngkau, sakarang mĕnjadi pokok limau ini. Mari-lah anak-ku sa-hari-hari bĕrchakap dĕngan aku, dan jikalau Jainab tampak ĕngkau bĕrchakap dĕngan aku, nĕschaya-lah ia potong pangkal aku di-bakar api. Jikalau dĕmikian, hĕndak-lah ĕngkau mĕngambil biji buah limau ini satu sahaja mĕnanamkan di-dalam rimba bĕlantara."

Maka mĕnjadi dĕmikian itu pula, di-tampaki oleh Jainab budak itu bĕrchakap dĕngan pokok limau itu. Maka marah-lah dia, di-parangkan pokok itu di-bakar-nya. Tĕtapi Jariah pun ambil biji buah limau itu satu sahaja.

Sa-tĕlah bĕbĕrapa lama-nya, maka Jariah lĕpas daripada astana mĕlari masok hutan. Sudah ia bĕrjalan tiga ĕmpat hari, maka sampai-lah ka-pada tĕmpat yang sunyi. Maka fikir Jariah, "Ini-

lah tĕmpat yang tidak di-kĕnal-i oleh orang, buleh aku tanam biji-limau itu di-sini." Maka di-tanamkan biji itu di-situ, dia mĕnjaga tĕmpat itu sampai ter-jadi pokok kĕchil: tĕtapi pokok itu bukan ia bĕr-bangsa limau.

Maka dĕngan sĕlamat dudok-lah budak itu di-dalam hutan, mudah ia mĕndapat makan, sĕdikit pun tiada payah, dari sĕbab nyawa ĕmak-nya pĕliharakan dia. Lagi, pakaian-nya tidak mĕrosak atua mĕrobek. Arakian, maka lama-nya Jariah dudok didalam hutan, sa-hari-hari mĕnchari makan buah-buahan dan bĕrbuat pĕrhiasan daripada bunga-bunga dan-daun-daun dan sa-bagai nya. Maka sampai-lah chukup umor Jariah, tĕrlalu elok rupa-nya.

Maka kapada suatu hari dia bĕrjalan mĕnchari buah-buahan, tĕmu-lah ia dĕngan sa'orang raja yang bĕrburu di-dalam rimba itu, nama-nya Abdul Shah, molek-lah dia, lagi muda.

Maka raja itu bangsa-nya Mĕlayu, ia pun mĕngadapkan raja nĕgĕri itu. Maka hairan-lah Raja Abdul Shah mĕlihat pĕrĕmpuan di-dalam rimba bĕlantara. Maka di-pĕrĕksa-i-nya Jariah, bĕrtanya "Rumah mana" dan "Ibu bapa siapa nama?" dan "Apa kĕrja di-dalam hutan yang jauh sakali dari kampong atau rumah yang lain?"

Hatta, maka sĕmua hal ahwal-nya di-chĕrita-kan oleh Jariah ka-pada Raja Abdul Shah itu: di-tunjok-nya pokok itu mĕnga-takan; "Ini-lah ĕmak aku, tĕlah mĕnjadi pokok ini." Maka sangat-lah kĕpilu-piluan Raja Abdul Shah ka-pada Jariah, lagi jatoh-lah hati-nya ka-pada nya. Shahadan, maka Raja Abdul Shah mĕngambil pĕrĕmpuan itu mĕmbawa pĕrgi pulang ka-nĕgĕri-nya; ia-itu nĕgĕri Mĕlayu ini; dan pokok pun di-ubah-kan-nya mĕmbawa pula, hĕndak di-tanamkan di-dalam taman-nya.

Hatta, bĕbĕrapa lama-nya, sampai-lah ka-nĕgĕri Mĕlayu ini, di-bawa Jariah masok ka-dalam astana-nya, dan pokok itu di-tanam di-dalam taman-nya. Maka hairan-lah sĕgala orang-orang yang mĕlihat pokok endah-endah bagitu, di-tanyakan "Mana dapat pokok ini? dan "Apa nama nya?" dan "Mengapa daun-nya mĕragi sĕpĕrti kain?"

Maka Raja Abdul Shah pĕreksakan Jariah bĕrtanyakan "Apa nama pokok ini?" Maka jawab-lah ia "Daripada asal nama pokok ini, tiada-lah nama-nya dari sĕbab ia satu sahaja pokok bangsa ini, itu-lah yang mĕnjadi ĕmak sahaya." Maka Raja Abdul Shah bĕrtanyakan "Mĕngapa daun-nya mĕragi sĕpĕrti kain?" Maka jawab-lah Jariah. "Yang bĕrtĕlan warna mas, ia-itu daripada warna kulit ĕmak sahaya elok-lah dia, puteh kuning kulit-nya sĕpĕrti mas. Dan yang bĕrtĕlan merah ia-itu daripada darah ĕmak sahaya, dan yang bĕrtĕlang hijau ia-itu daripada warna ayer di-dalam tĕmpat ĕmak sahaya mati tĕnggĕlam." Sĕpĕrti itu jawab-lah Jariah, sĕmua-nya dĕngan sa-patut-nya.

Maka Raja Abdul Shah pangil-lah sa'orang yang pandai di-dalam 'ilmu hikmat, di-chĕrita-kan ka-pada-nya sĕmua hal ahwal Zulaika dan Jariah itu, di-suroh-nya mĕlĕpaskan Zulaika daripada mĕnjadi pokok itu. Maka orang itu bĕrjawab kapada Raja Abdul Shah, di-suroh nya mĕngambil dahan pokok itu sa-kĕrat. Lagi di-bĕri-nya obat, di-suroh nya masok dahan itu ka-dalam obat-nya. Tĕlah masok, maka pĕchah-lah bĕkas obat itu, kĕluar-lah Zulaika. Maka sangat-lah sukachita Jariah dan Raja Abdul Shah, dan sĕgala orang-orang yang hazir, mĕlihat Zulaika hidup balek mĕnjadi orang.

Maka bĕbĕrapa lama antara-nya, Raja Abdul Shah hĕndak bĕrnikah dĕngan Jariah. Maka di-suroh-nya orang pĕrgi mĕngadap ayah Jariah mĕngkhabarkan sĕmua hal ahwal istĕri-nya dan anak-nya; lagi, Raja Abdul Shah mĕmintak akan dia bĕrkabulkan bĕrnikahan itu.

Shahdan ayah Jariah pun kabul-lah bĕrnikahan itu, sangat sukachita ia mĕnĕngar khabar istĕri-nya dan anak-nya hidup lagi. Maka di-bĕri-nya Jainab kapada pĕrtanda-nya di-suroh nya mĕngudongkan lĕngan Jainab satu, dan kaki-nya satu, dan tĕlinga-nya di-potong satu sa-bĕlah, dan mata-nya di-chuchok satu mĕnjadi buta sa-bĕlah, lagi lubang hidong-nya di-potong satu. Kĕmudian di-bĕri nya Jainab itu mĕnjadi hamba Jariah, mĕngĕrjakan pĕrkĕrja'an yang hina sahaja. Maka pokok itu pun hidup lama, dan anak pokok-nya pun banyak, sampai sĕkarang tĕlah bĕrnama oleh orang "pokok Puding."

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# A Pangan Vocabulary

*By* H. E. Savage.

The following words were obtained from Pa'Amok, the headman of a Party of Pangan (Semang) people whom I met in the jungle, early in March 1923. They were then camping near the Sungai Belang, a small stream near the source of the Sungai Sokor. The latter is a river in Kelantan which rises among some small hills, distant from Kota Bharu some fifty miles in a south-south-westerly direction. The Perak-Kelantan boundary is about 18 miles to the west and the Siam-Kelantan boundary about 25 miles to the north-northwest.

The party consisted of about eight men, four or five women and several children. The men were armed with blow-pipes and darts, and one young fellow had an old and worn spear-head fixed to a far from straight shaft.

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Note:—Reference Ad. indicates similarity with the word in "A vocabulary of Pangan," by T. S. Adams, (J. S. B. R. A. S. No 85, 1922).

"M" means that the word is Malay or possibly of Malay origin. When two Pangan words are given for one English meaning, the second, if different, is that given by the informant upon being checked.

They mixed fairly freely with Malays, and at the time of my visit were collecting 'rotan' and 'damar' for two Malays who were living in the camp.

Pa' Amok spoke Malay very well, but his guttural speech sounded strange to my ears, although the Kelantan Malays seemed to have no difficulty in understanding him.

Both men and women wore only waist cloths; short, dirty and ragged. In one instance the clothing of a man consisted of what looked like two pieces of the sheath of the 'pinang' flower, suspended from a string round his waist.

Pa' Amok, whom I engaged for several days as a guide, slept at night in the ashes of a large fire, built for that purpose, between two logs.

| | | |
|---|---|---|
| Afraid. | Entang. | Ad. Ettu. |
| Alive. | Gus. | Ad. Tigos. |
| All. | Kom. | |
| Always. | Mechup. | |
| Ankle. | Senik-chang. | |
| Ant. | Les. | |
| Ascend. | Luik. | |
| Attap. | Apau. | |
| Awake. | Poh. | Ad. Epog. |
| Bathe. | Englai. | |
| Bear. (animal). | Babas. | |
| Because. | Hakul. | |
| Below. | Lakayan, Lapiong. | |
| Bird. | Kawal. | |
| Black. | Beting. | |
| Blind. | Pat. | |
| Blood. | Nyap. | |
| Blow-pipe. | Belau. | Ad. Ulah, (inner), Lok, (thinner end.). |
| Body. | Lih. | Ad. Olah. |
| Breast. (female). | Am. | |
| Bring. | Ayui, Ayai. | |
| "Butir." | Mid. | |
| Buttocks. | Kit. | Ad. Tabrohked. |
| Calf. (of leg). | Lingut. | |
| Can. ("buleh"). | Jis. | |
| Centipede. | Lipan. (M.) | |
| Child. | Wong. | |
| Chopper. ("parang"). | Wing. | |
| Clear. | Penading. | |
| Cockroach. | Lipas. (M.) | |

| | | |
|---|---|---|
| Cold. | Temkit. | |
| Contents. | Gal. | |
| Cut. | Chuh. | Ad. Chok. Ketus. (see snap). |
| Dark. | Ekot, Lekut. | |
| Day. | Keto. | |
| Daylight. | Keto-boi. | |
| Dead. | Kemut. | |
| Deaf. | Hing. | |
| Deep. | Lawis, Miyok. | |
| Descend. | Kam. | |
| Different. | Asin. (M.=asing). | |
| Difficult. | Susah. M. | |
| Dog. | Achok. | Ad. Chuak. |
| Drink. | Am. | |
| Drunk. (intoxicated). | Kut. | Ad. Ekok. |
| Ear. | Enting. | |
| Earth. ("tanah"). | Teh. | Ad. Te. |
| Egg. | Makut, Makuk. | |
| Evacuate. (bowels). | Tuh. | |
| Eye. | Mit. | |
| Eye-brows. | Chin-chin. | |
| Extinguish. | Pelut. | Ad. Pud. |
| Fall. | Keriok. | Ad. Keluk. |
| Female. | Babok. | Ad. Babok. |
| Far. | Mejek, Mejib. | |
| Fever. | Chepit. | |
| Fingers. | Jaib. (M. from "jari"?) | |
| Fire. | Us. | Ad. Os. |
| Food. | Chik. | |
| Foot. | Chang. | |
| Forehead. | Petu. | Ad. Petuk. |
| Fowl. | Manuk. | |
| Frog. | Chang-kai. | |
| Fruit. | Kebut, Kebok. | |
| Go. | Egh. | Ad. Sog. |
| Good. | Chup. | Ad. Jib. |
| Green. | Abun. | |
| Give. | Belun. | Ad. Belaur. |
| Hair. | Chok. | |
| Hair on head. | Chok-koi. | |
| Half. | Yapedes. | |
| Hand. | Chas. | |

| | | |
|---|---|---|
| He. | Moh, Ong. | |
| Head | Koi. | |
| Headwaters ("hulu") | Gea. | |
| Hear. | Keling | |
| Heart. ("hati"). | Kelang. | |
| Heel. | Ketih. | Ad. Katik. |
| Here. | Hingoh. | Ad. Anoh. |
| Hill. | Chebak. | |
| Hole. | Ayang. | |
| Hot. | Bekut. | |
| House. | Dong, Din. | Ad. Dik. |
| Hulu. | Gea. | |
| I. (me, myself). | Eng. | |
| If. | Jikat. (M.="jika"). | |
| Ill. | Pias. | |
| In. | Nyut. | |
| Is. | Hoe. | |
| Is not. | Hoe-wek. | |
| Jungle. | Hup. | |
| Just now. | Ka-ong. | |
| Kill. | Chit. | |
| Kindle. | Chong. | |
| Knife. | Wes. | |
| Know. | Kedit, Edip. | Don't know. Panidip. |
| Large. | Bum, Tebong. | |
| Leaf. | Halik. | |
| Leech. | Lawan. | |
| Less. | Jaib-biat. | |
| Listen. | Kejing. | |
| Little. (a little). | Kanit. | |
| Look for. | Lawak. | |
| Maggot. | Kemai. | Ad. Kemor. |
| Maiden. | Wong-keda. | Ad. Kedhud. |
| Make. | Dik. | |
| Ma'ay. | Hamit. | |
| Male. | Tamkal. | |
| Man. | Kecheh. | |
| Many. | Kum. How many? | Engut?. |
| Mat. | Nus. | |
| Mattress. | Lemik. | |
| Meet. | Dapit. | Dapit. (M. "dapat"?) |
| Misty. | Kabut. (M.) | |
| Monitor lizard. | Juat. | |

| | | |
|---|---|---|
| Monkey. | Tabong. | |
| Mosquito. | Agas. (M.) | |
| Mouth. | Han. | Ad. Nyang. |
| Navel. | Dot. | |
| Near. | Pedas, Pedis. | |
| Neck. | Ungut. | Ad. Tang'u. |
| Night. | Likut. | |
| No. | Biak. (M.="biar"?). | |
| Noise. | Nah. | |
| Noon. | Mejut. | |
| Nose. | Moh. | |
| Not. | Ayang. | |
| Now. | Anang-nu. | |
| Old. | Cheteh. | |
| One. | Naing. | |
| Only. | Belab. | |
| Open. | Bukak. (M.="buka"). | |
| Order. ("suroh"). | Oui. | Ad. Os. |
| Otter. | Helong. | |
| Penis. | Lak. | Ad. Loah. |
| Person. | Hamit, Jim. | |
| Pig. | Babi. (M.) | |
| Place, (a place). | Lengut. | |
| Pole. | Tap. | |
| Put. | Boh. (?M.="buboh"?). | |
| Quarter. | Asing. | |
| Quiet, (be quiet!). | Wiet! | |
| Raft. | Rakit. (M.) | |
| Rattan. | Awai. | |
| Red. | Benteh. | |
| Remain. | Bejok. | |
| Request. | Agut. | |
| Resin ("damar") | Hanut. | |
| Rhinoceros. | Agap. | Ad. Nagab. |
| Root. (aerial). | Awai. | |
| „ ("ubi"). | Bak. | |
| Rope. | Awai. | |
| Rotten. | Ang-aat. | |
| Run. | Bechit. | |
| Same. | Eduat. | |
| Sarong. | Chawal. | |
| See. | Jel, Al. | |
| Self-conscious. | Lat. | |

| | | |
|---|---|---|
| Shin. | Langut. | |
| Shoulder. | Kelap. | |
| Shoot. ("tembak"). | Bedil kawa. (M.) | |
| Shout. | Jim. | |
| Shut. | Dong. | |
| Sit | Nyut, Engoh. | Ad. Gul. |
| Skin. | Ketok. | |
| Sleep. | Tek. | |
| Slow. | Gol. | |
| Small. | Kenit. | |
| Snake. | Jekop. | |
| Snap. (of string). | Ketus, (?M.="putus"). | |
| Sole of foot. | Bekis-chang. | |
| Speak. | Nah. | Ad. Tenur. |
| Spear. | Matak. (?M.= from 'mata-lembing"?). | |
| Squirrel. | Uat. | |
| Stand. | Tenong. | |
| Stick. | Tokat. (M.= "tongkat) | |
| Stomach. | Biat. | |
| Stray. ("sesat"). | Jili-wing. | |
| Strike. | Katok. (M.) | "). |
| Sun. | Mik-ketut.=Mitkelo. | |
| | | |
| Tail. | Hatik. | |
| Take. | Akit, Angkit. (?M.="angkat"?). | |
| Tall. | Mejok. | |
| Teeth. | Hain. =mouth?. | |
| Tree. | Keboh. | |
| U. ('Fallen'). | Tah. | |
| Testicles. | Entap. | |
| That. | Tun. (?M.="itu"?). | |
| There. | Ningoh. | |
| ,, ("sa-belah situ"). | Natap-tam. | |
| Thigh. | Belok. | |
| This. | Nyoh. (?M.="ini"?) | |
| Thorn. | Jelik. | |
| Throw away. | Pelipis. | |
| Thunder. | Kail. | |
| Tie. | Ikat. (M.) | |
| Tiger. | Ok. | |
| To-morrow. | Ketok. | |
| Tongue. | Lentit. | |
| | | |
| Undergrowth. | Leng-long. | Ad. Lemog. |
| Urinate. | Kenum. | |
| | | |
| Wait. | Entai. | |
| Want. | Perdap. | |
| Water. | Tam. | |

| | | |
|---|---|---|
| We. | Eng. | |
| What. | Bue. | |
| Where. | Nagal. | |
| Wicked. | Jelut, Chit. | |
| Wife. | Keneh. | Ad. Leh. |
| With. | Kejin. | |
| Woman. | Keneh. | |
| Yes. | Ola. | |
| Yet—not yet. | Biat. | |
| You. | Moh. (M.="Mu," the Kelantan colloquial | |
| Young. | Keda. | "you.") |

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# The Dusuns and the Chinese

*By* IVOR H. N. EVANS, *M. A.*

The story that the Dusuns are of Chinese origin dies hard and still another attempt has been made to revive it. I am amongst those who have tried to give it a fitting burial, though, it seems, a living one, as a fairly recent contributor to the *Proceedings of the Royal Society* has dug it up again, choosing to ignore all the reasons against the Chinese theory.

First of all let us consider one or two points which tend to show that the Dusuns are not Chinese:—

(*a*) The Chinese are a round-headed people. The Dusuns, on the other hand, are, as far as we have evidence, long-heads (p. 312, Appendix B),[2] or tend that way. They recognize this and note it as a difference between themselves and the round-headed Bajaus, who are Malayans (p. 187).

(*b*) I have collected and published (*Studies in Religion Folklore and Custom in British North Borneo and the Malay Peninsula*) over fifty folk-tales from the Tuaran and Tempasuk Districts and the great majority of these are from the Dusuns, yet there is no mention in them of the Chinese having been in the country in ancient times.

(*c*) The Dusun language belongs to the Malayo-Polynesian group. If the Dusuns are "the direct descendants of former Chinese settlers" as "was always accepted as a fact" in the early days of the Chartered Company, surely they would have preserved at least some traces of their origin in their speech (p. 187).

1. *Proceeding of the Royal Society*, B. Vol. 95, 1923. *The Dusuns of North Borneo*, by Godfrey Hewett, pp. 157-163.

2. The page references are to my book "Among Primitive Peoples in Borneo."

To take now some of Hewett's points:—

(1). "The Dusuns themselves claimed it;" *i.e.* Chinese descent. Do they? I have never heard them do so, though it is said that one small tribe, in the Klias Peninsula, does lay claim to *recent mixed* Chinese ancestry (p. 290). Where, and from whom, did Hewett obtain his evidence, and has he published it?

(2). "The late Sultan Hashim of Brunei asserted it as beyond question." The Bruneis are Malays, and Malays are sometimes credulous about, and ignorant of, the affairs of neighbouring peoples. It is only necessary to listen in the Peninsula to the stories which they tell about the aborigines to satisfy oneself of this fact. They are also adepts at manufacturing history and derivations of place names (p. 278). Some of the Malay Sultans trace their descent from Alexander the Great, whose direct descendant suddenly put in an appearance in Sumatra!

(3). "Chinese trade had been carried on unchecked in all probability for 2,000 years." To assert that Chinese trade has been carried on with Borneo for so long a period is a bold statement. Nobody denies, however, that China was trading with Borneo at least as far back as the Sung dynasty. The porcelains found in Bornean villages prove this (p. 277).

(4). "The great mountain Kinabalu, the Chinese Widow, contributes its small quota of evidence. The name is Malay....."

The Dusuns, inlanders and presumably earlier arrivals in the country than the coast-dwelling Malays, call this mountain "Nabalu," which rather breaks up the "Kina" portion of the name, which is said to mean "Chinese," but I have discussed the origin and meaning of this name at length (pp. 275-290). Mr. Hewett, however, appears not to care to consider evidence put forward, unless it fits in with his theory.

(5). With regard to the irrigation canals and the bridge at Kaung Ulu (illustration facing p. 24), I do not feel myself very competent to speak, owing to lack of engineering knowledge. I would suggest that if the Dusuns are, or were, not capable of making such things themselves, they might just as easily have learnt the art from the Hindu invaders of the Archipelago, whose influence appears to have extended even to the Philippines, as from the Chinese. Though, granting that this was the case, I am not going to claim that the Dusuns are Indians! The bridge at Kaung, as far

as the limited literary material at my disposal allows me to judge, appears to be not very dissimilar from those made by several peoples of Assam and Upper Burma, whose cultural, if not racial, connection with the Indonesians is well known†

To conclude, Hewett's "history" seems to me to be a jumble of "tradition," real history, supposition and arguments from very slender premises. He retells the story of the dragon of Kinabalu and the jewel, and says that he has "heard many versions from natives." He notes that the story is preserved in the Brunei archives and says that it was written down at the end of the 18th century, but it would be interesting to know from what natives he obtained the legends, for he does not seem to have recorded them, and I am inclined to wager that he did not get them from Dusuns. He says that the story is an allegory, but I should be more inclined to describe it as the usual Malay fairy tale, like that about Alexander the Great. He then quotes Earl, and with approval, as saying that "the Chinese suppose the Dyaks to be descended from a large body of their countrymen *left by accident* on the Island, but this opinion is entertained solely on the faith of a Chinese legend. If they can prove paternity to the Dyaks they must extend it to the whole race inhabiting the interior of the large islands of the Archipelago." It seems to me clear enough that Earl did not believe the story in the slightest, for he says that if the Chinese claim paternity to one set of Indonesians they must extend it to all. Dyak, at that time, was a word commonly used by Europeans to denote *any* of the pagan inhabitants of Borneo.

[Mr. Hewett's theory can hardly be taken seriously, but as it applies to a tribe to whose language we have recently devoted a whole number of this Journal[1], we have published Mr. Evans' criticism. The Dusuns are Indonesians, members of a race which is spread from the Eastern Himalayas to the Moluccas, from Formosa to the Southern Sunda Islands; a Mongoloid people, and as such having affinities with the "Chinese," but in no way decended from them within historical times C. B. K.].

† Hewett claims that Kaung Ulu bridge is a survival of Chinese days. He says, "It is a compromise, or rather a combination of the cantilever and suspension principles———." An example of a cantilever bridge, from Bali, is figured in a recent number of "Inter-Ocean" (Nov., 1925, p. 732). Why not claim this as Chinese as well?

1. Vol. II (part 2) Nov. 1924. A Grammar and Vocabulary of the Dusun Language *by* A. L. Gossens, pp. 87-220.

# Miniopterus medius in the Malay Peninsula

*By* F. N. Chasen.

**(Records of the Raffles Museum, No. 14.)**

*Miniopterus medius* Thos. and Wrought, P. Z. S. 1909, p. 382.
Kalipoetjang, Tji-Tandoei R., Java.

Included in a small collection of bats taken in caves in the limestone hill, Gunong Pondok, Perak, but at no elevation and sent for indentification by Messrs. Sworder and Abraham are four *Miniopterus* which agree well with the original description of this species and also with a specimen from Pulau Kaban, East coast of Johore (identified by Thomas) with which we have compared them.

This seems to be the first time that the genus has been recorded from the mainland of the Malay Peninsula although as *medius* has already been found on islands off both the East and West coasts (vide Journ. F. M. S. Mus. Vol. VII, 1916, p. 4) the occurrence is not very remarkable.

In the colour of the pelage the series before us exhibits two distinct phases a character apparently quite usual in the genus. The male is almost uniform in colour and dark brown (darker than "light seal brown") above and below. One female is also in this uniform phase, but is generally warmer in tone and nearer to vandyke brown. The other two females are bicoloured. They are near vandyke-brown on the head, neck, throat and breast, slightly colder on the underparts, and blackish brown elsewhere. The zones of colour are well defined.

**External Measurements taken in the Flesh**

| No. | Sex. | Head & Body. | Tail. | Hind-foot. | Ear. | Forearm. |
|---|---|---|---|---|---|---|
| 1 | ♂ | 50 | 42 | 8 | 11 | 42 |
| 2 | ♀ | 50 | 47 | 7.5 | 10.3 | 42 |
| 3 | ♀ | 52 | 45 | 9 | 11.7 | 42 |
| 4 | ♀ | 51 | 45 | 8.5 | 10.5 | 41.5 |
| 5 | ♀ | 52 | 44 | 8·3 | 10.7 | 43 |
| Type | ♀ | 55 | 47 | 9 | 12 | 42 |

**Skulls**

| No. | Greatest length. | Basi-Sinual length. | Cranial breadth. | Greatest width across canines. | Front of $p^4$ to back of $m^3$. |
|---|---|---|---|---|---|
| 1 | 14.5 | 10.9 | 7.6 | .. | 4.3 |
| 2 | 15 | .. | 8 | .. | 4.6 |
| 3 | 14.5 | 10.9 | 8 | 4 | 4.6 |
| 4 | 14.2 | 11 | 7.8 | 4 | 4.5 |
| 5 | 14.7 | 11 | 8 | 4.2 | 4.5 |
| Type | 15 | 11.5 | 7.5 | 6.5 (?4.5) | 4.4 |

# The Laughing Gull (Larus ridibundus, Linn.) in the Straits of Singapore.

*By* C. Boden Kloss.

**(Records of the Raffles Museum, No. 15.)**

A resident of Singapore having, on the 16th December 1925, shot a number of terns for food off the coast of the island sent several birds to a local taxidermist for mounting. Mr. P. de Fontaine of the Raffles Museum visited the shop shortly afterwards and finding that one of the birds was quite unknown to him persuaded the owner, Mr. F. de Souza, to give the skin to the Museum.

The bird is an example of *Larus ridibundus*, the Laughing, or Black-headed Gull which, though common at times in the northern Philippine Islands and the head of the Bay of Bengal and occasionally visiting the west coast of Travancore, South India, rarely migrates further south. Singapore lies only 1° 18′ north of the equator and I believe that the present example constitutes a southern record for the species.

The bird is immature. The crown is pale greyish white, the feathers with dark grey bases; and there is a dark patch behind the earcoverts, a few brown patches on the coverts near the bend of the wing and on the tertiaries, and a broad blackish bar at the tip of the tail. The bill and feet are yellow, the former with a black tip. Wing 295 millimetres long (10.6 inches); tail 125 mm.; tarsus 43 mm.; bill (culmen from frontal) 43 mm.

The sex was not ascertainable and owing to its immaturity it is not possible to say whether the bird belongs to the typical race, or to *L. r. sibiricus* Buturlin.

# The Pied Cuckoo-Shrike

*By* C. Boden Kloss.

**(Records of the Raffles Museum, No. 16.)**

In November 1923 Mr. E. C. Stuart Baker contributed to the Bulletin of the British Ornithologist's Club (XLIV, pp. 12-14) a partial revision of the races of the Pied Cuckoo-Shrike *Lalage nigra* Forst.

He selected Camorta Island in the Nicobar group as the type locality for *L. n. nigra;* gave a new name (*L. n. brunnescens,* type locality, Selangor) to the bird of the Malay Peninsula, Sumatra, Java and Borneo; attributed *L. n. schisticeps* Neumann (Journ. f. Ornith. LXVII, 1919, p. 333. Type locality, Culion Id.) to the Philippines only; and assigned *L. n. timorensis* (S. Müll) to Timor, Lombok and Bali. This treatment is inacceptable.

In Nov. Zool. XXIII, 1916, p. 99, Hellmayr showed that *Turdus sueurii* Vieillot, had priority over *Ceblepyris timorensis* S. Müll.: and *L. n. sueurii* is therefore the name for the Lesser Sunda (and also Celebesian) form.

Stresemann has stated that *L. n. schisticeps* is an artifact (Orn. Monatsber. XXX, 1922, p. 88) the body being that of a Pied Cuckoo-Shrike from Culion, the head that of a *Pericrocotus cinereus* from China.

The International Rules do not seem to deal with artifacts, unless 27a applies to them. However, Neumann's description is a comparative one and *schisticeps* is erected on account of differences shown by the body which may be regarded as the type material. This is convenient since the name has been used several times.

Outram Bangs was unaware of Neumann's work when he described the bird of the Philippines as *L. n. milifica* (Bull. Mus. Comp. Zool., Harvard, LXV, 1922, p. 80. Type locality, Lubang near Luzon) which becomes the name for the Philippine form should artifacts be ruled out as types.

But Bangs (l.c.s.) realising that Forster's "India Orientale" of 1781[1] was not the same thing as India proper (cf. Baker) or even the British Indian Empire (in which the Nicobars have been included only from 1807-1814 and again since 1869) restricted the type locality of *L. nigra nigra* to Singapore, "being as likely as anywhere else to have been whence the type actually came."

In "Treubia" (V, Feb. 1924, p. 282) Robinson and Kloss showed that *L. n. nigra* occurred in Java in the west and middle parts only, the Eastern part being occupied by *L. n. sueurii.* [They further suggested that *Perissolalage chalepa* Oberholser,

1. Fide Bangs. Baker gives "India."

from Solombo Besar Id., East Java Sea (gen. and sp. nov., Proc. U. S. Nat. Mus., 54, 1917, p. 182) was also a synonym of *L. n. sueurii.*]

The presence of two races in Java raises an interesting point, for it was on a bird from that island that Horsfield based his name, *Ceblepyris striga* (Trans. Linn. Soc. XIII, 1821, p. 145). It is not possible to say from the description alone to which race this applies, but Horsfield's birds, six representing both sexes, were sent to the Museum of the East India Company and should now be at South Kensington. *C. striga* has always been ranked as a synonym of *L. n. nigra* (*terat* auct.), but critical examination may prove it to belong to *L. n. sueurii.*

In any event since *nigra* has been fixed on a Malayan form the Nicobar bird is without a name and may be known as

**Lalage nigra davisoni** subsp. nov.

after the later Mr. W. R. Davison, a predecessor of mine in the Nicobars and the Raffles Museum. Female always dark grey, but compared with Philippine birds slightly brownish. Wings 86-89 mm. (fide Baker t. c. s. p. 13).

To stabilise the synonymy I select Singapore (though hardly so likely as Bangs thinks for species of the eighteenth century) as the type locality of *Turdus terat* Bodd. (Tabl. 1783, p. 17: ex D'Aubenton, Pl. Enl., 273 fig. 2; "Merle des Indes Orientales" Month. Hist. Nat. Ois. III, 1775, p. 397) and *Turdus orientalis* Gm. (Syst. Nat. I, 1788, p. 821 ex Brisson).

According to Sharpe (Cat. Birds, IV. p. 95) *Pycnonotus humeraloides* Lesson, 1846 (description inaccessible to me) is another name for the species: it will only upset the nomenclature if based on Philippine or Bornean material. Salvadori (Ann. Mus. Civ. Gen. V, 1884. p. 145) also refers to it *Colluricincla maculosa* Peale, which belongs, however, to *Lalage pacifica* (Gm.) probably an isolated subspecies of *nigra.*

*L. n. schisticeps* is not confined to the Philippines. Salvadori and Sharpe (l. c. s.) both describe it from Borneo under *Lalage terat* (Salvadori with 'a?) and state that Bornean specimens agree with Philippine birds. Bangs, too, records a female from Borneo, grey above as in the Philippine form and a little larger than birds from Java, Singapore and the Peninsula. His measurements for ten Philippine birds' wings are 92-95 mm.: for nine examples of *n. nigra,* mostly Javanese, 82-88 mm.

In 1924 and the following year Raffles Museum did some collecting in North Borneo, and in June in Labuan Island and July on the mainland near Jesselton obtained a series of Pied Cuckoo-Shrike which are inseparable from the Philippine bird,

which is easily distinguished from *n. nigra* by the grey, instead of brown, crown and back of the female. The species is resident as in the Labuan series is one that can only just have left the nest.

Examples from the vicinity of Kuching, Sarawak, are also *L. n. schisticeps*.

I have a single specimen from Sampit on the south coast of Borneo, a male with a wing of 91.5 mm. It is impossible to say to what race it belongs but in view of Walden's statement (T. Z. S. 1872, part 2, p. 69) that the *Lalage* of S. E. Borneo has a longer wing (95 mm.) and broader bill than the Javan form, it is probably *schisticeps or sueurii* that occurs there.

I give some details about the birds before me:—

**L. n. nigra.**

Perak, Malay Peninsula, to Singapore.
20 ♂ ♂, wings 84-90 mm.
8 ♀ ♀, „ 82-88 mm.

Sumatra.

5 ♂ ♂, wings 85-87 mm.
5 ♀ ♀, „ 86-89 mm.

Java, West and Middle.

10 ♂ ♂, wings 88-91 mm.
3 ♀ ♀, „ 88-92 mm.

The juvenile bird is like the adult female but transversely banded by buff edges to the feathers above and longitudinally striped with black below. Bars on the upper parts disappear except on the rump and the streaks of the lower side gradually change into bars. This is the adult female plumage through which the male passes, gradually developing black upper parts with a grey rump and losing the bands and buffy wash below where it becomes greyish white.

**L. n. schisticeps.**

Borneo.

2 ♂ ♂, wings 91. 5-94 mm.
7 ♀ ♀, , 87-95 mm.

In this race the juvenile bird is brownish grey above (less brown than *n. nigra*) becoming grey in the female. I have no specimens showing how the male plumage develops.

**L. n. sueurii.**

Java and Celebes.

5 ♂ ♂ wings 93-98 mm.
4 ♀ ♀ „ 90-96 mm.

Young birds have the bars of the upper surface and the edges of the wings a deeper buff than in the races above and they are perhaps more strongly striped below. The barring on the underside of the adult female is much less extensive and old birds are probably largely immaculate on breast and abdomen. Males appear to develop through the female plumage, as examples (not quite fully adult) have the wings partially edged with buff. Old males have pure white breasts.

I would again draw attention to the point that the common statement of the older naturalists "Habitat in India Orientali" or "India" was one of no precise significance. It did not necessarily mean either India proper of the English, or "India" of the Dutch, but was generally a comprehensive term covering the area east of the Arabian Sea as far perhaps as New Guinea. This should be kept in mind when a type locality is being selected.

In the same way "Malacca" of earlier English writers did not necessarily indicate the British Settlement of that name but was generally used, as by Continental authors to-day, for the southern half of the Malay Peninsula (vide Ibis, 1918, p. 95).

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## Two Neglected Bird Names : Eucichla guajana (P.L.S. Mull.) and Chloropsis cochinchinensis (Gm.).

*By* C. Boden Kloss.

**(Records of the Raffles Museum No. 17.)**

In the List of their Birds collected in Java (Treubia, V, 1924, p. 279) Robinson and Kloss pointed out that two races of *Eucichla cyanura* (Bodd.) occur in the island and since the eastern form has the broad blue gorget shown by the "Merle de la Guiane" (D'Aubenton, Pl. Enl. no. 355) on which Boddaert's name is based, East Java would be the type locality[1] leaving West Java (type locality restricted to Bantam Province) for *Myiothera affinis* Horsfield (Trans. Linn. Soc., XIII, 1921, p. 154) which, as he says, differs in the band on the breast.

The facts are as stated, the eastern bird having a narrower breast-band; but as to nomenclature I find that Cassin pointed out in 1864 (Proc. Acad. Nat. Sci. Philadelphia, p. 251) that *Turdus cyaneus* Bodd. (Tabl., 1783, p. 21) is antedated by *Turdus guajanus* P. L. S. Müll (Syst. Nat. Suppl., 1776, p. 145, ex D'Aubenton).

The specific name of this Pitta is therefore *Eucichla guajana* (P. L. S. Müll.) and the subspecies are :—

*E. guajana guajana* (P. L. S. Müll.) East Java, Bali.

1. Now further restricted to the district of Banjoewangi.

*E. guajana affinis* (Horsf.) West Java.

*E. guajana irena*.[2] (Temm., Pl. Col., no figure, text opposite Pl. 591: Sumatra) Sumatra and the Malay Peninsula north to the Isthmus of Kra.

*E. guajana schwaneri* (Bp. Consp. Av., 1, 1850, p. 256: Borneo). Borneo.

*Chloropsis cochinchinensis* (Gm., Syst. Nat., 1, 1788, p. 825: ex D'Aubenton, Pl. Enl., no. 643, fig. 3, Le Verdin de la Cochinchine: Montb., Hist. Nat. Ois., III, p. 409) is another name that has given way to a more recent and now better known one, viz., *Chloropsis chlorocephala* (Walden).

The first name has been referred to several birds, but since Sharpe in the Catalogue (VI, p. 27) placed *Turdus cochinchinensis* Gm., in the synonymy of *C. nigricollis* (Vieill.) from Java he has been generally followed.

An examination, however, of the original figure and description leaves no doubt that Gmelin's name applies to the northern bird later described by Walden. The figure is not conclusive in that it may be taken to have the yellow breast of *nigricollis*, but it shows the yellow forehead of the northern bird which is absent in the Javanese form. Reference to the text settles the matter.

Montbelliard says that the black of the throat "is surrounded by a kind of yellow gorget which diminishes on the breast" [in *nigricollis* this gorget expands there, instead of dwindling]. Further he says "This little thrush comes certainly from Cochinchina...."

The specific name of this Leaf-bird is therefore *Chloropsis cochinchinensis* (Gm.) and the sub-species are:—

*C. cochinchinensis cochinchinensis* (Gm., Cochinchina). Brahmaputra River to Annam and south to Lat. 6° 30′ in the Malay Peninsula.

*C. cochinchinensis icterocephala* (Less., Rev. Zool. 1840, p. 164. Sumatra). Malay Peninsula south of 6° 30′ and Sumatra.

*C. cochinchinensis nigricollis* (Vieill., Nouv. Dict., XXVII, p. 432. Java). Java.

*C. cochinchinensis viridinucha* (Sharpe, Ibis, 1877, p. 15, Borneo). Borneo.

It is true that Temminck, who examined the type, says (Pl. Enl., V, under *Phyllornis cochinchinensis*) that it does not differ from specimens received in large numbers from Java and Sumatra. But no bird of this kind is common to both islands and if he is wrong about one locality he may well be wrong about both, especially as he ascribes it to Borneo and the continent also.

2. This is *Pitta boschi* of Müll. and Schleg., and authors.

His localities for the genus are unreliable; *aurifrons* is specifically stated to come from Palembang in Sumatra, whereas it is a continental bird.

Whatever views are held as to its application *cochinchinensis* cannot be ignored longer as a valid specific name for the four races above-named.

Another name that must be revived is **Chloropsis flavocincta** Sharpe, which has place priority over *C. kinabaluense* of the same author based on the female (Ibis 1887, p. 445). This bird, though it has a black-throated female, may prove to be only a mountain development of *viridinucha* (e.g. also a subspecies of *cochinchinensis*) when its range is better known.

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# An abnormal, or unnamed, Sea-snake

*By* N. Smedley *and* C. Boden Kloss.

**(Records of the Raffles Museum, No. 18.)**

In January last a fine sea snake of the genus *Laticauda* (*Platurus* auct.) was speared off the coast of Singapore by Mr. W. Birtwistle, who gave it to the Raffles Museum.

Only two species of *Laticauda* are known to occur in Malaysian seas and, lacking the azygous shield on the snout which is the most distinguishing character of *L. colubrina*, the specimen was at first glance thought to be *L. laticaudata*. Further inspection, however, showed that it possessed 23 rows of costal scales instead of the 19 rows of the latter and it was found to agree completely with *L. colubrina* except in the absence of the third prae-frontal. The eight examples of *Laticauda* already in the Museum were examined; six were normal *colubrina*, two resembled the present specimen in being without an azygous shield. *L. laticaudata* is not represented.

In his Herpetology of Japan (Bull. 58, U. S. Nat. Mus., 1907, p. 408) Dr. L. Stejneger writes under *L. colubrina* "A specimen from Queensland in the Zoological Museum at Christiana....is remarkable for lacking the azygous shield between the prefrontals, thus resembling *L. laticaudata* in this respect, though otherwise a normal *L. colubrina*, as shown by its 23 rows of scales and yellow supra labials."

"Dr. Franz Werner (Mitt. Zool. Samml. Mus. Naturk. Berlin, 1, Pt. 4, 1900, p. 104) mentions a similar specimen in the collection of the Vienna university, but he regards it as a hybrid between *L. laticaudata* and *L. colubrina*, a view I cannot accept, at least for the specimen in the Christiana Museum, which is in every respect a typical *L. colubrina*, but lacking the unpaired prefrontal."

We cannot accept the suggestion that specimens like that under discussion are hybrids between two species: *colubrina* is fairly common in local seas while *laticaudata* is rare: it has not yet been met with in the waters about the Malay Peninsula though known from the shores of Sumatra. These specimens are either aberrations of *L. colubrina,* as Stejneger considers, or less probably an unnamed species. An alternative is to regard *colubrina* as inseparable from *laticaudata,* as did Linnaeus.

But of our abnormal specimens one is juvenile, the others are 4 ft. 8½ inches and 4 ft. 2½ inches long. Wall (Snakes of Ceylon, 1921) gives the maximum lengths of *colubrina* and *laticaudata* as 5 ft. and 3 ft. 7 inches respectively. *L. colubrina* seems to be separable by size as well as lepidosis.

Barbour (Mem. Mus. Comp. Zool. Camb. U. S. A. XLIV, 1912, I, p. 131) treats the two as subspecies of *laticaudata* but the habitat of the two is the same and subspecies being geographical races cannot, in our opinion, exist side by side.

He has two specimens with 23 rows of scales and lacking the azygous shield, from the Indian Ocean and New Caledonia, though the latter has the frontal prolonged as though a third praefrontal were present. He notes that Peters and Doria regard the examples with an azygous shield as varieties of the others.

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## On the Development of the Dog-fish Chiloscyllium indicum (Gmel.)

*By* N. Smedley, *M.A.*

**(Records of the Raffles Museum, No. 19.)**

Through the kindness of Mr. R. P. Molony, of the Eastern Extension Telegraph Co., a number of Elasmobranch eggs were obtained from the Straits of Malacca. The data given were:—

Lat. 3° 6′ 10″
Long. 100° 34′ 05″
Sounding 35 fathoms, mud.
Bottom temp. 82°

On examination, seven of the eight eggs were found to contain embryos at various stages of development, the five most mature forms bearing all the external characters necessary for identification as *Chiloscyllium indicum* (Gmel.), a striped dog-fish, the adult of which reaches a length of nearly 3 ft.

The egg-case resembles that of *Scyllium canicula,* the common dog-fish of British waters, but differs from it chiefly in the curious mode of attachment. In place of the four tendrils by which the latter adheres to sea-weed or other fixed objects, there is a byssus-

like band growing from a lateral margin of the case. It consists of a mass of fine threads, united by mucilage. Each case measures from 2½" to 3" in length by 1½" greatest depth. The posterior end (judged from the general position of the embryo) is more pointed or compressed, the anterior truncate.

Boulenger (Camb. Nat. Hist. Vol. VII. Fishes) writes, "In the oviparous species" (of Elasmobranchi) "the eggs are extruded either singly or in pairs." It is therefore of interest to note that three of the eggs here referred to are firmly joined by the byssus-like attachment, the strands being continuous, and not merely intertwined. Each band of strands is 2"—3" long from the egg to the junction with the others. This would appear to indicate that these three eggs were laid at the same time. One case is empty, a second contains a young male with yolk-sac of about 10 mm. in diameter, the remaining one a female almost ready for hatching out, the yolk-sac empty and all but 1 mm. reabsorbed into the body.

In removing the other five egg-cases from the cable, the attachments had all been cut. More evidence is therefore required before it can be seen whether or not the eggs are extruded in series of three. Sundara Raj (Rec. Ind. Mus. Vol. X, 1914, p. 318) mentions the laying of egg-capsules in pairs, and singly. Southwell and Prashad (Rec. Ind. Mus. Vol. XVI, 1919, p. 222) found a single egg ready for laying in each oviduct of a gravid female, together with a number of developing eggs. The above case would therefore appear to be exceptional. The authors of both papers refer to the fish as *Chiloscyllium griseum*, Müll and Henle, which with *C. plagiosum* was regarded by Day as a synonym of *C. indicum* (Gmel.) Tate Regan and Garman recognise the three as separate species but the characters dividing them are very variable. For the purposes of this note, therefore, only one species is recognised. The following stages were represented:—

1. Egg-case filled with yolk. When opened the embryo, measuring 20 mm., adhered to the case.

2. The embryo, in length about 50 mm., is lying along the upper margin of the case. Below it is the yolk-sac, in form a slightly flattened sphere, with greatest diameter 23 mm. A fine blood-vessel runs over the surface of the sac, which has absorbed the whole of the yolk.

3 and 4. Embryo with form and markings similar to adult. Length 90 mm. Diameter of sac 20 mm.

5. Length approximately 95 mm. The yolk-sac is empty but the duct has not yet been absorbed. This duct in all specimens is distinct, measuring from 10 to 12 mm.

The young male referred to earlier is at a somewhat more advanced stage of development than 3 and 4, the female representing the final stage before hatching.

In specimen No. 5 the head is pointing to what has been designated the rear of the case. This appears to be exceptional.

The presence of colonies of hydroid organisms on the cases points to a lengthy period of incubation.

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## On a Stage in the Development of the Tiger-shark Stegostoma tigrinum (Gmel.)

*By* N. Smedley, *M.A.*

**(Records of the Raffles Museum, No. 20.)**

A single egg of the Tiger Shark, *Stegostoma tigrinum,* (Gmel.), was obtained by Mr. R. P. Molony from the Java Sea, lat. 4° 49′ 20″ S., long, 110° 6′ 15″ E., depth 32 fathoms, mud, bottom temp. 82°, surface temp., 84°.

The general form is similar to that of the egg-case of *Chiloscyllium indicum,* (Gmel.), the corners at one end being drawn in more or less to a point, the other end truncate. Neither "byssus" nor tendrils were present on this egg-case, and two specimens obtained from the Singapore Fish market in 1916 were similar in every way. The egg is comparatively large, measuring 175 mm. in length, by 95 mm. An interesting feature was that the yolk was in process of absorption by the yolk-sac from the egg-case, but the embryo had already developed the form and markings of the adult. In the case of *Chiloscyllium indicum,* on the other hand, the whole of the yolk had passed into the yolk-sac at a very early stage in the development of the embryo.

The young *Stegostoma* is 155 mm. in length, and bears the external characters of the adult, which grows to a length of 10—15 ft. The remnant of the yolk duct or umbilical cord is visible on another specimen of 275 mm. length.

The members of the family Scylliidae inhabiting Malaysian waters provide examples of three distinct types of egg-case.

That of the genus *Scyllium* has the four corners produced to form long tendrils, and it is not until these have become firmly entwined around some fixed object that the egg is drawn from the oviduct of the female.

*Chiloscyllium indicum* has a band of fine mucilaginous hairs which may form a means of anchorage after the laying of the egg.

In the case of *Stegostoma* no method of attachment is provided, and the egg apparently drifts until the hatching out of the young shark.

# Peripatus in the Malay Peninsula

*By* C. Boden Kloss.

**(Records of the Raffles Museum, No. 21.)**

The Raffles Museum possesses two examples of *Peripatus* from the Malay Peninsula. They have recently been determined by Professor W. J. Dakin as:—

1. *Eoperipatus horsti* Evans. (Type locality: Kuala Aring, Kelantan)

One specimen, which Dr. Dakin says is exceptionally large, from 16 miles west of Johore Bahru. Length in alcohol 62.5 mm. An interesting fact about it is that I found it at sea level crawling on an open road in bright midday sunshine, whereas *Eoperipatus* is locally an inhabitant of shady forest where it lives in rotten wood.

2. *Eoperipatus weldoni* Evans (Type locality: Bukit Besar, Patani, 3000 ft.)

One specimen. Obtained by Dr. R. Hanitsch on Kedah Peak, 3500 ft., in dead wood.

Under this name Dr. Dakin places the specimen found by Mr. A. C. Butler at 4000 ft. on the Larut Hills, Perak, which is the type of *E. butleri* Evans. As Austin Clark omits *butleri* from the list of species in his "Distribution of the Onychophora" (Smithsonian Misc. Coll, 65, No. 1, 1915, pp. 22-3) it would appear that neither recognises it.

The two specimens in the Raffles Museum, therefore, represent the two species so far known from the Malay Peninsula, of which *E. horsti* seems to be of lowland and *E. weldoni* of montane habitat.

Elsewhere in Malaysia *E. sumatranus* (Sedgwick) occurs in Sumatra while examples, at present undetermined, have recently been obtained in Sarawak.

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# Spolia Mentawiensia

**(Records of the Raffles Museum, No. 22.)**

The first of the reports to be published on the Raffles Museum Expedition to the Mentawi Islands is that on the Botany by Mr. H. N. Ridley, C.M.G., M.A., F.R.S: (Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew, No. 2, 1926, pp. 56-94.)

Mr. C. Boden Kloss, Director of the Raffles Museum, Singapore, contributes a preface from which the following is taken:—"The Mentawi Group, to the west of Sumatra, consists of the

islands of Siberut, Sipora, North and South Pagi, and a number of smaller islands. Siberut, the northernmost, is larger than the total area of the other three large islands, which are fairly equal in size.

"The islands are covered with heavy forest and their botany was unknown before the present expedition. A few plants, however, had been collected on Sipora by Herr Alfred Maass in the nineties ("Bei liebenswurdigen wilden," Berlin, 1902), and a few had been sent home from the Pagi Islands by Dr. W. L. Abbott and myself in 1902.

"I visited the islands in September and October, 1924, with Mr. N. Smedley, Assistant Curator of the Raffles Museum, Singapore, and a party of native collectors. Dr. H. H. Karny, Entomological Assistant of the Buitenzorg Museum, Java, also accompanied me, with native assistants, one of whom collected plants for the Herbarium at Buitenzorg. The material here discussed was obtained with the assistance of a native collector attached, on my invitation, by Mr. I. H. Burkill, then Director, Botanic Gardens, Straits Settlements.

"The Mentawi Islands are not very pleasant collecting grounds: they are largely swamp out of which rise hills nowhere exceeding 1,500 feet in height, and generally difficult to get to, as they are surrounded by soft ground. The Sago palm is common. The villages of the interesting Indonesian inhabitants are all situated on river-banks a few miles up-stream, and there are scarcely any paths except those made at the direction of the Dutch military posts for patrol purposes: these are often untraversable owing to floods, for there is much rain throughout the year.

"The collection was obtained near the Government stations at Siberut in the island of that name and Sioban in Sipora: it came from the sea-shore, low ground and swamps, cultivated areas, and from such hills up to 500 or 600 feet as we were able to attain. Owing to wet weather the plants had to be dried over fires.

"The Mentawi Islands lie parallel to, and 60-80 miles distant from, the west coast of Sumatra. Siberut is about 70 miles long and about 30 miles broad and its northernmost extremity is on Lat. 1° South.

"The islands are apparently connected with each other by sea-bottom of less than 100 fathoms in depth, and recent bathygraphical charts show a connection with Sumatra, via the Batu Islands to the north, by a narrow ridge of similar soundings, but I am inclined to doubt that this ridge is unbroken as indicated: some faunal groups exhibit remarkable peculiarities. Otherwise the islands are surrounded by depths of 100-500 fathoms of sea: further, everywhere directly between the group and Sumatra stretches the long Mentawi Sea, or Basin, with depths of 500-1000 fathoms.

"In view of the fact that nearly all the other land masses of Malaysia (the Peninsula, Sumatra, Java, Bali, Borneo, Palawan, etc.) stand on a shallow bank of less than 40 fathoms we should expect to find a greater difference betwen the Mentawi Islands and the rest of the sub-region than between any other two parts of it; but this collection indicates that, botanically, such is not the case. Possibly this is due to the lowness of the islands and their comparatively small size."

One new genus and fifty-six new species are described by Mr. Ridley:—

Genus:—*Polycycliska.*

Species and varieties:—*Popowia rufescens, Saurauja singalensis* var. *longifolia, S. siporensis, Vatica lutea, Stemonurus pauciflorus, Tetrastigma encephalosperma, Cissus flaviflorus, Medinella venusta* var. *grandiflora, Mycetia minor, Hedyotis resuspinata, Polycycliska cylindrica, Zuccarinia cordata, Ixora cuspidata, Psychotria sumatrensis, Ardisia latipes, A. omalscarpa, Madhuca lanuginosa, Maba carpinifolia, Chilocarpus auriantiacus, Hoya variifolia, Didissandra minor, Cyrtandra chiritoides, C. insularis, Didymocarpus labiatus, Staurogyne citrina, Premna sumatrana, Aristolochia klossi, Endiandra crassifolia, Litsea tenuipes, Trigonostemon sanguineus, Gelonium rubrum, Conocephalus oblanceolatus, Ficus chamaecarpa, F. microsyce, Elatostemma longirostre, Pellonia longipetiolata, P. l.* var. *hirta, Microstylis trinervia, Liparis klossi, L. dissitiflora, Bulbophyllum klossi, Trichotosia calvescens, Dendrocolla cerina, D. punctata, Vrydagzynea bractescens, Hedychium cornutum* var. *minor, Gastrochilus roseopunctatus, Elettariopsis puberula, Hornstedtia parviflora, Phaeomeria, minor, Plagiostachys sumatrensis, Alpinia quadriloba, Daemonorops dracunculus, Pandanus spinosissimus, Freycenetia klossi, Homalomena multinerva, Scindapsus longipetiolata, Pollinia sumatrensis, Gnetum oxycarpum.*

In his introductory remarks Mr. Ridley notes that of the 365 species obtained 119 are known elsewhere only from Sumatra and have not yet been discovered in the Malay Peninsula, but that the plants from the coasts of the Mentawi group have a greater affinity with those of the peninsular lowlands owing to the wide distribution of many seashore plants. Clearly shown in this collection are certain peculiar characteristics of the Sumatran flora. As in Sumatra species of *Saurauja* and *Cyrtandra* are comparatively abundant: while of *Didissandra* and *Didymocarpus* only one species was obtained in each.

"The most important new species in this collection are a second species of the hitherto monotypic genus *Zuccarinia,* previously known only from Java, the yellow-flowered *Staurogyne citrina,* all the other species having white or brown flowers, and the curious new genus *Polycycliska* belonging to the small Malayan group of *Coptophyllum* and *Pomazota.* The occurrence of *Xantho-*

*phytum villarii* previously known only from the Philippines is a remarkable extension of distribution."

Mr. Ridley digresses to note that Palaearctic species are comparatively rare in the Malay Peninsula compared with those of Sumatra and Java. One may point out that this is probably due to the fact that the highest Malayan peak (7186 ft.) is less than two-thirds the altitude of the island mountains. The Mentawi group, with hills of not more than 1500 ft. cannot attain even to a submontane flora. Perhaps because of this the only deep-water province of the Malaysian subregion, viz., certain of the west Sumatran chain of islands, even when thoroughly explored will exhibit few marked peculiarities to distinguish it botanically.

It is unfortunate that new species from the Mentawi Islands, which are not known from Sumatra and which possibly will never be found there, should be named *sumatrensis* or *sumatrana*: an entirely inaccurate idea of the type localities and distribution is conveyed.

"Spolia Mentawiensia" is the general title under which in various journals all the reports, in the main zoological, on the 1924 visit to the islands will be issued. C. B. K.

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# Miscellaneous

## Adatrechtbundels.

We have recently received a copy of the twenty-fourth issue of the Adat law bundles. The volume treats of village organisation in the Moluccas, the native landsystem, native marriage and succession law, the administration of native justice in the Moluccas, awards in cases relating to native law and many other data on Moluccas law; all of them taken from civil service officers' reports, from judicial awards, from scattered publications, from reports by educated natives, etc., nearly all of them in Dutch; a few in Malay.

The series of monographs, of which this is one, is produced by the Adat Law Foundation, a Board established in 1909 by the Royal Institute for Language, Agriculture and Ethnology of the Dutch East Indies (Koninklyk Instituut voor de Taal-, Land-en Volken Kunde van Netherlandsch-Indie) Dr. C. Snouck Hurgronje is the President and Mr. C. van Vollenhofen the Secretary.

Of the bundles of laws and customs already published (Martinus Nijhoff, s'Gravenhage, is the printer) three deal with Sumatra, one with Borneo, five with Java, two with Bali and Loombok, three with Celebes and three with the Moluccas and Philippines. There are seven miscellaneous bundles. The prices of the volumes range from two to six guilders.

This series may not appeal to the ordinary British reader on account of the language in which it is published: but to the serious student of the native laws and customs of the "Malay Archipelago" and Peninsula it is indispensable. C. B. K.

# Carboniferous Plants from the Malay States

*By* W. N. EDWARDS.

(PLATE I.)

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In 1924 Mr. J. B. Scrivenor discovered a few plant remains, in an exposure of shale with thin ash beds, at a locality about one third of a mile upstream from the mouth of the Sungei Chiku, a tributary of the Galas, in Kelantan. The rocks belong to the Raub Series of the Malay States, whose age is from Carboniferous to Permian.

The hard bluish shales contain a quantity of quite unrecognizable plant debris, and a few fern-like frond impressions (probably Pteridosperms) which are not very well preserved. Mr. Scrivenor kindly presented these specimens to the British Museum (Natural History), and they are briefly described here. They are the only fossils so far found in the Raub Series of Kelantan (See Savage, Journ. Malayan Branch Roy. As. Soc., Vol. III, pt. 1, 1925, p. 66.)

**Pecopteris** cf. **cyathea** (Schl.)

The finest specimen is shown at Plate I, fig. 1. It is a portion of a broad rachis of a Pecopterid frond, bearing pinnae with closely set pinnules. In habit it resembles species of the *P. arborescens* group, but the pinnules are larger than in *P. arborescens* itself. The venation can scarcely be seen in this specimen, but another fragment shows distinct traces of once-forked lateral veins. This character, as well as the size of the pinnules, suggests that the species might be referred to *P. cyathea* (Schl.), but the material is not sufficiently well preserved for accurate determination, and the genus *Pecopteris* is notoriously difficult. It may be noted that some authors have united *P. cyathea* with *P. arborescens*. Comparison is also possible, as regards habit and venation, with the recently described *P. verbeeki*, Gothan and Jongmans, from Sumatra (see below), which however has fructifications of the *Scolecopteris*-type; in the present material there is no trace of a fructification.

Some impressions of a smooth rachis may belong to the same species.

Plate 1, fig. 2 shows two small fragments of what appear to be *Cordaites* leaves, or possibly a single leaf split as in some specimens of *Cordaites hislopi*. Another indistinct fragment

**Cordaites** sp.

resembles the base of a small leaf of *Cordaites*. It is impossible, however, to draw any definite conclusions from such scanty material.

## Discussion.

The interest of these rather obscure and fragmentary specimens has been considerably enhanced by the discovery of Upper Carboniferous plants in Sumatra, recently described by Drs. W. J. Jongmans and W. Gothan ("Beitrage zur Kenntnis der Flora des Oberkarbons von Sumatra," Med. No. 2, Geol. Bureau voor het Nederlandsche Mijngebied, 1925).

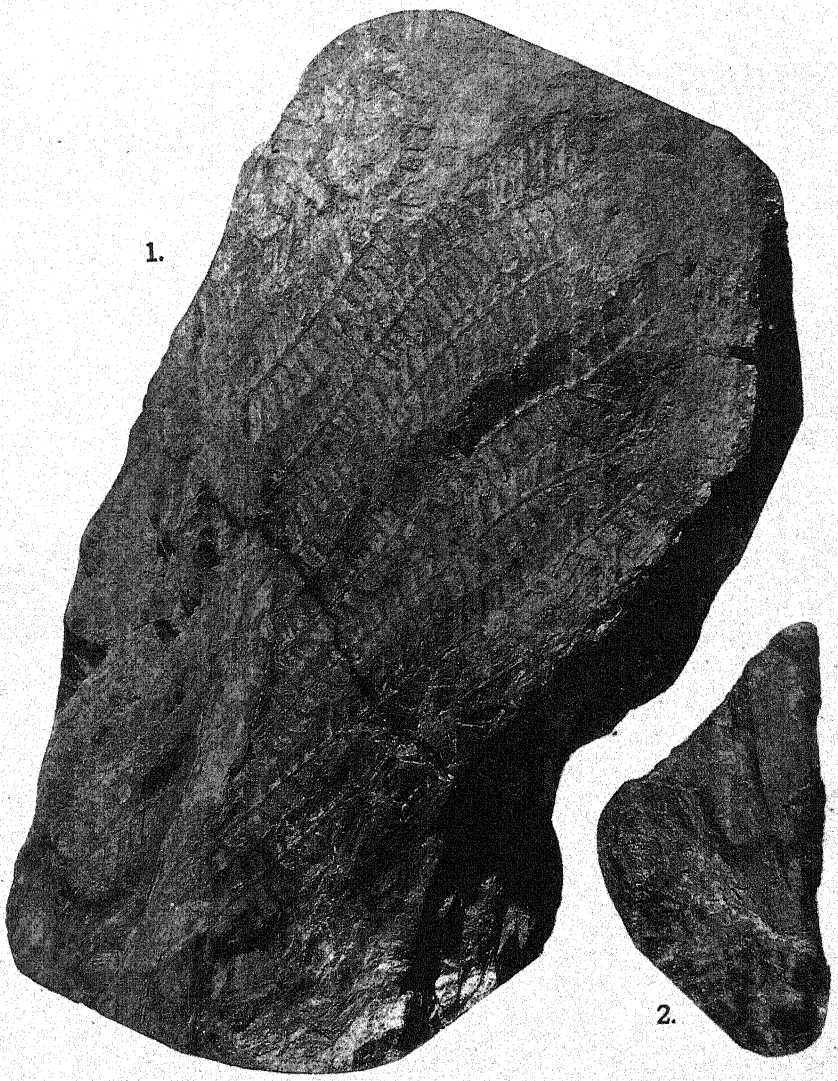
The authors describe about a dozen species of plants, all of the arcto-carboniferous type, indistinguishable from an Upper Coal Measure flora of Europe, and containing no elements of the *Glossopteris* flora. The majority of the plants are referred to well-known European species, and the flora is particularly rich in members of the genus *Pecopteris* (including, be it noted, three species of the *P. arborescens* group.) The age is regarded as Stephanian.

The authors discuss fully the significance of this unexpected occurrence, and its bearing on such questions as the relationships in time and space of the Gondwana flora with the European, and with the Chinese *Gigantopteris*-flora. They suggest that the Sumatra flora may be a southerly extension of a south-Asiatic Stephanian flora not yet discovered elsewhere, or an indication of the "European" character of the pre-Gondwana flora of this region, and they emphasize the importance of searching for further plant-bearing localities of late Palaeozoic age in neighbouring regions. Mr. J. B. Scrivenor's discovery of *Pecopteris* in Kelantan suggests the presence of a similar Stephanian flora in the Malay Peninsula, and it is very much to be hoped that a further investigation of these rocks may be made, in order to indicate more definitely the relationships of the contained flora.

## Explanation of Plate.

Fig. 1. *Pecopteris* cf. *cyathea* (Schl.). Natural size. Stephanian, Sungei Chiku, Kelantan. Brit. Mus. Nat. Hist., Geol. Dept., No. V. 17100.

Fig. 2. *Cordaites* sp. Natural size. Same locality, B. M. N. H., Geol. Dept., No. V. 17101.




CARBONIFEROUS PLANTS FROM KELANTAN, MALAY PENINSULA.

# The Palaeontology of British Malaya

*By* J. B. SCRIVENOR.

Palaeontology, the study of the fossil remains of organisms in rocks, is not a subject that appeals to many people, and in a country where mining is the chief concern of geologists, no doubt appears to be of little or no importance. It is mainly, however, by means of fossils that the age of rocks is determined, which allows that the succession of rock formations in an area under examination may be shown by them, though one formation may not be seen directly above or below another; therefore, when attempting to unravel geological structure, fossils may be very useful, and they are also of general interest to zoologists.

The amount of information about palaeontology in British Malaya is now considerable, but the publications dealing with the collections of fossils are scattered and difficult of access. I propose therefore in this paper to summarize these papers and some unpublished matter, and to add a few notes of my own.

The first collection of fossils in British Malaya was made by Mr. H. F. Bellamy from sandstone near Kuala Lipis, Pahang. They were described in 1900 by Mr. R. B. Newton, I. S. O. ("On Marine Triassic Lamellibranchs discovered in the Malay Peninsula. Proc. Malacological Society, Vol. IV, Part 3, October 1900, pp. 130—135.) The specimens were as follows:—

*Chlamys valoniensis.*
*Pleurophorus elongatus?*
*Pteria pahangensis* (new species.)
*Mytilus* cf. *minutus.*
*Gervillia inflata.*
*Pteroperna malayensis* (n. sp.)
*Myophoria malayensis* (n. sp.)
*Myophoria ornata.*
*Myophoria ino-equicostata.*
*Myophoria* (sp. ?)
*Actinodesma bellamyi* (n. sp.)

Mr. Newton named this rock the "Myophorian Sandstone" and pointed out that *Chlamys valoniensis* is characteristic of the Rhaetic, or uppermost division of the Trias, while *Myophoria* belongs exclusively to the Trias. In 1904 I collected more specimens from this locality, but nothing new excepting fish remains, which Sir Arthur Smith Woodward, F. R. S., recognized

as belonging to *Semionotus*, a genus characteristic of the Trias. This collection then established the presence of a Rhaetic fauna in the Malay Peninsula. Later I found similar fossils in sandstone between the 16th and 17th miles on the Benta-Kuantan Road, and in 1915 Mr. E. S. Willbourn found similar fossils again in the same sandstone at the 70¾ mile on the Pahang Railway (i.e. 70¾ mile north of Gemas station.)

These three localities are all about on the same line of strike and if this line is continued through Johore, it passes close to the west of Singapore Island, where two collections of fossils have been made.

The first of these collections was made by Dr. R. Hanitsch and myself at Mount Guthrie, a hill near Mount Wallich which has now been entirely cut away and was then in process of demolition. The fossils were described by Mr. R. B. Newton in 1906 (Fossils from Singapore. Geological Magazine, November 1906, pp. 487—496.) They comprised marine mollusca and plant-remains; the rock was described as a " light drab-coloured compact clay." The following is a list of the specimens:—

MOLLUSCA.

*Cucullaea scrivenori* (n. sp.)
*Arca* sp.
*Gervillia hanitschi* (n. sp.)
*Volsella* cf. *compressa.*
*? Nuculana* sp.
*? Nuculoid shell.*
*? Lucina* sp.
*Astarte scrivenori* (n. sp.)
*Astarte guthriensis* (n. sp.)
*Astarte guthriensis* (new variety.)
*Goniomya scrivenori* (n. sp.)
*Goniomya singaporensis* (n. sp.)
*? Thracia* sp.

PLANT-REMAINS,

*Podozamites lanceolatus.*
*Carpolithes* sp., an isolated seed.

Considerable importance was placed on the occurence of *Podozamites*, which occurs in the Upper Gondwana deposits of India. Mr. Newton said (op. cit. p. 488):—

"The Singapore Clays, therefore, with their estuarine contents, may be of Middle Jurassic age and about the horizon of the Inferior Oolite of England or the so-called Bajocian of Continental geologists. They possibly represent an extension or outlier of the

Upper Gondwana rocks of India, as well as forming part of the other fossiliferous areas of Eastern Asia, including Korea, Japan, and Siberia, which have yielded a similar vegetation."

In addition to the plant-remains at Mount Guthrie, where also I found a six-inch seam of brown coal, I found obscure vegetable remains in shale close by at Tanjong Malang, and a piece of fossil wood at Mount Wallich. In this connection I may also mention here that in a railway cutting near Padang Tungku, north of Kuala Lipis, Pahang, I found obscure vegetable remains, probably from the same horizon.

Mr. Newton wrote doubtfully about the age of this collection from Mount Guthrie and a later collection found in sandstone in Morse Road, which judging from the dips of the rocks in this part of Singapore Island, must be above the Mount Guthrie deposit, shows that the age ascribed was too young.

This later collection was from "soft, pinkish, fine-grained, argillaceous sandstone." forming a cutting on Morse Road, Mount Faber, at about 100 yards from the highest point of the road. The collection was described by Mr. R. B. Newton (On Marine Triassic shells from Singapore, Ann. Mag. Nat. Hist. Vol. XII, 1923, pp. 300—321.) The following is a list of specimens:—

CEPHALOPODA.

A fragment of an ammonite.

GASTEROPODA.

*Promathildia colon.*

PELECYPODA.

*Lopha* cf. *montis caprilis* (an oyster.)
*Chlamys valoniensis ?*
*Syncyclonema* sp.
*Spondylus dubiosus.*
*Prospondylus comtus.*
*Gervillia scrivenori.*
*Palaeocardita* cf. *crenata.*
*Cucullaea* (?)
*Palaeocardita* cf. *crenata.*
*Myophoria ornata.*
*Myophoria* cf. *goldfussi.*
*Myophoria bittneri.*
*Myophoria.* sp. indeterminable A.
*Myophoria* „ „ B.
*Schafhautlia astartiformis.*

*Opis* cf. *hoeninghausi.*

*Modiolopsis gonoides.*

BRACHIOPODA.

A Terebratuloid Shell.

*Spiriferina* cf. *fragilis.*

Mr. Newton writes in this connection:—"Lithologically the same throughout, it is certain that the Singapore deposits must he of one geological horizon, and forming, as it seems possible, a continuation of the Myophorian Sandstone of Pahang developed some 200 miles north of Singapore, which has been regarded as of Rhaetic age, although, like the Singapore material, containing both St. Cassian and Muschelkalk species.....

"For the present then, we may consider the Singapore beds as of Upper Trias or Rhaetic age until better-preserved and more varied material is available to facilitate a greater accuracy of statement as to their true position in the Triassic Series."

To revert to the Kuala Lipis fossils, another collection made in 1902—1903 by Mr. Cecil Wray from the same locality has been described by Dr. J. Weir of Glasgow University (Geol. Mag. 1925, pp. 347—350), who, in the same paper, also discusses the fossils found in Morse Road, and Mount Guthrie, Singapore. In his analysis of the significance of the specimens Dr. Weir expresses the opinion that in view of the predominance of infra-Rhaetic species, and the richness of the genus *Myophoria* in species and individuals, these rocks are older than Rhaetic, though Triassic. He comments particularly on the absence of the Rhaetic zone fossil *Pteria contorta.* This fossil, he points out, does occur in the Napeng Beds of Burma, where a fauna was described as Rhaetic by Miss Healey (Pal. Indica. New Series, Vol. II, 4. 1908.) On the other hand, in his paper on the Morse Road fossils, Mr. Newton quotes Miss Healey as recognizing his *Pleurophorus elongatus* to be her *Modiolopsis gonoides* and saying:—"this confirms Mr. R. B. Newton's opinion that the Myophorian Sandstone in which these casts occur is Rhaetic or Upper Triassic." Dr. Weir, however, says of this fossil, *Modiolopsis gonoides,* that it is "the only species common to the Myophorian and Napeng Faunas."

This difference of opinion is, we may assume not very important, and there is also an ambiguity in the terminology which I should endeavour to explain. The Trias in England has three divisions, the Rhaetic, the Keuper, and the Bunter, the last being the lowest. The Rhaetic, however, was originally considered to be the base the younger Lias, not Triassic, and is still, I believe, so considered by some continental geologists. Therefore the term "Upper Trias" may be doubtful: it may refer to the Rhaetic or the Keuper. In his "Text Book of Geology" Sir

Archibald Geikie gives the following divisions of the British Trias:—Rhaetic, Upper Trias or Keuper, and Lower Trias or Bunter; and the "Upper Trias" of the author's quoted above refers, it appears, to the Keuper. The horizon of the rocks concerned may be Rhaetic or Keuper. In determining the age of any fossiliferous rock far removed from the typical deposits there are two difficulties: first, one must have a large number of species to form a sound conclusion, and these Malayan collections are decidedly small; second, the doubtful logic of correlating as on the same horizon such distantly separated faunas at all. In this case the evidence certainly points to the rocks being Triassic: it is a moot point if they are Rhaetic or Keuper. I think we may continue to refer to them as Rhaetic, bearing in mind that they may ultimately be proved to be a little older.

There is further evidence of Triassic rocks in the Peninsula. In 1903, when examining a deep road-cutting at Putus Semanggol, in Larut, I found fossils in shale. These were described by Professor T. Rupert Jones as a Crustacean *Estheriella radiata* var. *multilineata*, but on the strength of new material from Kedah, Mr. Newton concluded in 1925 that they are really molluscan remains comparable to *Halobia moussomi*, and probably of Middle Triassic age, older than the Myophorian Sandstone. By "Middle Triassic" here, the Muschelkalk of Europe is meant, which is between the Keuper and the Bunter.

The Kedah material was collected by Mr. E. S. Willbourn at Kuala Nerang and Kampong Kuala, and comprised two fragments of ammonites, crinoid stems, *Halobia* cf. *moussoni*, a form closely related to the foregoing, and *Halobia malayensis*. These were found in dark shales, which, on the strength of the palaeontological evidence, Mr. R. B. Newton says may be of Muschelkalk or Middle Trias age (On Marine Triassic Fossils from the Malayan Provinces of Kedah and Perak. Geol. Mag. 1925, pp. 76—85.)

In British Malaya there are four fossiliferous formations older than recent deposits. The collections described above come from a widespread series of quartzites and shales often altered to schists, which has been called the Tembeling Series, and the Malayan Gondwana Rocks. Younger than this series are three patches of Tertiary beds with coal, of which the largest is in Selangor (Malayan Collieries Ltd.) In these Selangor Coal Measures fossil plants and a few crushed *Helix* have been found. The plants were described by Mr. H. N. Ridley, F. R. S., as on the whole of a modern type. Among them he recognized:—

*Angiopteris erecta.*
*Vaccinum scortechinii?*
*Litsea.*
*Eugenia.*

*Tetradinea* or *Lindera.*
*Polyalthia.*
*Laurinea.*
*Macaranga.*

Palaeontologically these Tertiary beds are of little interest.

Older than the Quartzite and Shale Series are two other fossiliferous formations, the Chert Series, and the calcareous Raub Series.

The Chert Series does not afford satisfactory palaeontological evidence of age, but contains fossils that are interesting from another point of view.

The Chert Series is known from extensive beds of shale and chert *in situ* and also from numerous pebbles of chert in the younger Triassic quartzite. At the base of the Quartzite and Shale Series, chert is interbedded with quartzite in Negri Sembilan. At many localities *Radiolaria* are numerous in the chert, but only in one case have they been found to be recognizable generically. In 1904 I found a pile of road metal by the Thomson Road Reservoir, Singapore, consisting of indurated shale or chert and a rock that is probably a very fine-grained acid volcanic tuff. From later knowledge of the country I expect this metal came from one of the small neighbouring islands. At the time no one could remember where it came from. Sections under the microscope revealed *Radiolaria* and the late Dr. G. J. Hinde, F. R. S., wrote the following description:—

"Six microscopic sections of a rock from Singapore containing *Radiolaria* have been submitted to me by Mr. R. B. Newton, F. G. S., who received them from Mr. Scrivenor of the Geological Department of the Federated Malay States. The rock from which the sections were taken is labelled as 'Indurated Shale'; it was met with as loose blocks in the vicinity of the Reservoir at Singapore; at the time of writing Mr. Scrivenor had not found the rock *in situ*, but hoped to do so at an early opportunity. The microscopic sections were very skilfully prepared by a native (Mohamed Mansur), they have been sent to this country by Mr. Scrivenor in order to ascertain if the *Radiolaria* would throw any light upon the geological age and relation of the rock."

"The *Radiolaria* are fairly numerous in the rock; in some narrow bands they are closely aggregated together. Some occur only as mere casts which are not infrequently filled with a greenish mineral, whilst in others the minute structure of the skeleton is preserved. It would require a larger number of thin sections to obtain anything like a complete knowledge of the various forms of *Radiolaria* present in the rock, but specimens of the following genera have been recognised:—*Sphœrozoum, Cenosphœra, Xiphosphœra, Carposphœra, Dorydictyum, Cenellip-*

*sis, Staurodictya, Staurodrappa, Spongodiscus, Porodiscus,* and *Lithostrobus.* Though the series of forms is varied, I have not been able to discover any forms sufficiently distinctive to furnish a clue to the age of the rock, nor does there appear to be any close relationship to the *Radiolaria* discovered in the rocks of Borneo.

Beyond *Radiolaria* no other fossils are preserved in these sections."

In Singapore again pebbles of chert have been collected from coarse quartzite on Blakang Mati and found to contain organisms resembling *Polyzoa.*

In the Tekai River, a tributary of the Tembeling, Pahang, two pebbles of chert were found in coarse quartzite that proved to be of exceptional interest, in that they contain well preserved plant remains. These were submitted to Professor A. C. Seward, F. R. S., of Cambridge University, who sent me the following note on them (this note was published in my Annual Report for 1921):—

"The specimens numbered 1446 FA. to FD. are unquestionably of a stem of a conifer and in all probability the conifer was araucarian.....There is, however, no possible doubt that the specimen is a conifer; it is certainly not a pine..... The two sections 1454 CA, CB, are extremely interesting. The small organs which are preserved and some of which are shown in your photographs are, I have little doubt, slender roots of some vascular plant. In the centre of some of them is a small strand of vascular tissue (xylem), and from the superficial cells root-hairs are occasionally given off. The structure of some of these roots clearly suggested swampy ground or even water, and the whole appearance of the matrix in which they occur reminds me of a mass of silicified peat. There is no doubt at all that the chert cannot be a deep-water deposit, and my own opinion is, so far I can judge from what I have seen, that it was formed in shallow water or over submerged peat."

In 1902 Mr. A. K. Coomaraswamy described *Radiolaria* and plant-remains associated together in porcellaneous shales of Upper Gondwana age near Madras (Geol. Mag. 1902, pp. 305, 306.) In British Malaya, however, Radiolaria and plant- remains have not been found together in chert. Mr. Coomaraswamy believed that the plant-remains he found had drifted out to sea.

*Foraminifera* and sponge-spicules also have been found in Malayan chert.

An exceptional occurrance of chert was found in 1913 in Perlis, near Bukit Chuping, on the site of a planter's bungalow now demolished. It contains large, but poorly preserved Foramini-

fera which I have little doubt are *Fusulinidae*. A species closely resembling them is *Fusulinella konnoi*, Ozawa, figured in "A brief critical revision of the Fusulina species recently described, with additional studies on Japanese Fusulinæ" by Mr. Yoshiaki Ozawa (Journ. Geol. Soc. Tokyo, Vol. XXXII, 1925, plate X, figs. 1, 2, 3.) This species is referred to the Upper Carboniferous (op. cit. p. 24.) It is not certain, however, that this chert belongs to the Chert Series. The exposure was poor and I failed to find it again some years later. It may be silicified limestone: it will be referred to again later.

The Chert Series contains no satisfactory palaeontological evidence of its age, but as we shall see later, its position in the field restricts the possibilities to small limits. Below the Chert Series is the Raub Series, consisting of limestone, generally crystalline (marble), and calcareous shales. In the Langkawi Islands and Perils, quartzite and shale, with subordinate bands of limestone, occur conformably below the limestone. In Perlis these have yielded fossils which will be mentioned later.

Prior to 1903 a few crinoid stems only had been found in the limestone. During my work in Pahang, however, I found fossils that were of value in determining the age of the rock.

I will mention first fossils found at Lubok Sukum, on the Pahang River. These were found in de-calcified Raub shales. Mr. Newton wrote the following description:—

"The matrix containing the fossils is a soft, argillaceous shale exhibiting regular lines of stratification with occasional bands of a harder rock, similar to a sandstone. According to the acid test it exhibits no evidence of calcareous matter, and this opinion has been kindly confirmed by Dr. Prior of the Mineral Department, British Museum. The fossils themselves are badly preserved, being little more than impressions, and therefore are not sufficiently defined for illustration and detailed description. The most prominent are those having a circular or elliptical outline which Mr. G. C. Crick determines as an Ammonoid resembling Waagen's *Xenodiscus*.

"There are also some straight tube-like organisms which appear to be closely allied to *Dentalium herculea* of De Koninck. The association of these two fossils is interesting since similar forms are found together in the Upper Productus Limestone of the Salt Range, India, a fact which would favour the Malay specimens being of Permian age.

"The Salt-Range fossils of this horizon have been figured and described by Waagen in the *Palaeontologia Indica*, 1879 and 1880, Ser. xiii. Vol. 1. plates 2 and 16, and it is to this work that reference should be made for figures of *Xenodiscus* and *Dentalium* for comparison with the Malay specimens.

"There are a number of other organisms but very much too obscure for determination, among them being an Aviculopectinoid impression and some possible Brachiopod remains.

"Both Mr. Crick and I think these fossils younger than those referred to by Prof. Hughes as Permo-Carboniferous in his notice of specimens from Malaya collected by the "Skeat Expedition" (British Association Report, 1901, p. 414) on account of the presence of a Trilobite determined as *Proetus*." The fossils collected by the Skeat Expedition came from Lower Siam. I shall have occasion to refer to them later."

I found other fossils in limestone at Mill Gully and Goa on the old Punjom Concession, near Lipis. Mr. Newton wrote of these:—

"The Mill Gully and Goa limestones contain obscure coral, crinoidal, and other structures as well as some fairly good remains of *Cephalopoda*, which my colleague Mr. G. C. Crick, F. G. S., refers to *Orthoceras, Cyrtoceras, Gyroceras* and *Solenocheilus;* hence these rocks may be recognized as of Carboniferous age."

Later, a collection of fossils was made by me with the assistance of Mr. J. T. Marriner and Mr. P. A. Satow from the limestone of Bukit Charas, Kuantan. These were described as follows by Dr. Stanley Smith, F. G. S:—

"1. *Carinia* sp. aff. *C. gigantea* Michelin.—The form is rather smaller than is typical for *C. gigantea*, and resembles some specimens from the Avon Gorge, Bristol. The dissepimental region is very wide and is entirely free from septa, except for a narrow fringe; the dissepiments are, consequently, coarse. The septa are short and leave a wide central region solely occupied by tabulae. Major septa alone are developed. There are curious bands in the matrix which suggest algal growth. The specimens in the British Museum, which most resemble this, occur in the *Dibunophyllum* zone of the Viséan.

"2. *Cyathaxonia* sp.—The septa are long, and both series well developed. The central column is small; and the dissepimental tissue occupies a large portion of the corillum. *Cyathaxonia* occurs in D (*Dibunophyllum* zone of the Viséan, Carboniferous Limestone.)

"3. A *Clisiophyllid*.—The specimen is too imperfect to justify any comment; probably an immature form. The *Clisiophyllids* are characteristic Viséan Corals.

"4. *Diphyphyllum* sp.—The corallite shows those characters which are associated with '*Diphyphyllum*,' viz., two, well developed cycles of septa; fine dissepiments; and broad, concave, closely-set tabulae occupying the middle portion of the coral. The specimen may be a simple form or a single corallite of a colony. '*Diphyphyllum*' is the name given to those forms of

*Lithostrotion* in which the columella is absent or is imperfectly developed, and, as at present used, does not constitute a natural genus. It is possible that this specimen may have no affinity with *Lithostrotion*. *'Diphyphyllum'* is characteristic of rocks of Viséan age.

"The above determinations leave no doubt that the limestone belongs to the Viséan stage of the Carboniferous, and probably to the *Dibunophyllum*-zone of the Viséan."

After this collection has been made, Mr. E. S. Willbourn collected specimens from the same hill which we determined as the Brachiopod *Strophomena*, a genus ranging from the Ordovician to the Carboniferous.

In 1924 while travelling with Mr. H. E. Savage in Kelantan, we found an outcrop of Raub shales with thin bands of volcanic ash on the River Chiku. In the shale were fossil ferns, which are the subject of a separate paper in this Journal (Malayan Branch, Royal Asiatic Society) by Mr. W. N. Edwards of the British Museum of Natural History. Mr. Edwards thinks that these plants, *Pecopteris* cf. *cyathea* and *Cordaites* sp., indicate the presence in Malaya of a Stephanian flora of European type, and comments on the discovery of a similar flora in Sumatra. He says it is suggested that:—"the Sumatra flora may be a southerly extension of a South-Asiatic Stephanian flora not yet discovered elsewhere, or an indication of the 'European' pre-Gondwana flora of this region."

The "Stephanian" is the highest division of the Carboniferous System in France and Belgium.

In the Langkawi Islands I have found in limestone a few fossils, *Polyzoa*, Crinoid stems and a Gasteropod, which I believe to be carboniferous, but in Perlis Mr. Wilbourn has collected fossils from quartzite, believed by us both to be below the limestone, which are the subject of a paper by Mr. Newton (on Fusulina and other organisms in a partially calcareous quartzite from near the Malayan-Siamese Frontier. Ann. and Mag. of Nat. Hist. Vol. XVII. p. 49—64 1926.) The fossils found are:—

FORAMINIFERA.

*Fusulina* cf. *granum-avenae.*

*Doliolina* cf. *lepida.*

STROMATOPOROIDEA.

*Myriopora?*

ANTHOZOA (Corals)

*Chaetetes* sp.

*Stenopora* Sp.

A *Cyathophylloid* coral.

CRINOIDEA.

*Cyathocrinus?*

POLYZOA.

*Fenestella* cf. *retiformis.*

MOLLUSCA.

*Schizodus* sp.

*Pleurophorus* sp.

The most abundant organism is the *Fusulina*, on the strength of which Mr. Newton considers the rock to be late Carboniferous or Permian.

I referred above to a collection made by the Skeat Expedition many years ago, determined as Permo-Carboniferous by Prof. McKenny Hughes of Cambridge University. This collection came from a siliceous rock in Patalung, Lower Siam, and was described in the Report of the British Association, Glasgow, 1901, p. 414. In 1920, however, Dr. F. R. Cowper Read published his results of a re-examination of these fossils, and gave his opinion that they are probably Lower Carboniferous, i.e., of European Carboniferous limestone age. I have not seen the locality where these fossils came from, but it is not far from the Perlis locality, and I cannot help suspecting that it is part of the thick series of sedimentary rocks with subordinate limestone-bands that we know in the Langkawi Islands and Perlis.

Summarizing these results we have:—

1. The Myophoria Sandstone in Pahang and Singapore, which is certainly Triassic, the Putus Semanggol shale with *Halobia moussoni*, and the Kedah rocks with *Halobia* also, which may be of Middle Triassic or Muschelkalk age.

2. A Chert Series with no definite palaeontological evidence of age, below the Myophoria Sandstone and other Triassic rocks.

3. A calcareous series below the Chert Series ranging, according to the palaeontological evidence, from Permian to Viséan, and a lower conformable sedimentary series that has yielded fossils believed by Mr. Newton to be late Carboniferous or Permian.

With regard to the third group, at present the field-evidence appears to conflict with the palaeontological-evidence, but I am sure that as work progresses, and larger collections are made, the difficulties will disappear. The fossil ferns from Kelantan are particularly interesting, as they indicate the existence of a European, late Carboniferous flora close to the typical *Glossopteris* flora of the Gondwana system, which at the base is late Carboniferous or Permo-Carboniferous, containing plant-remains distinct from the European Carboniferous type.

In conclusion, I wish to record my appreciation of the valuable assistance given to the Geological Department by the eminent palaeontologists who have described the collections made in British Malaya. Palaeontology is a specialist study that demands one's whole attention and requires access to a well-equipped library. Such work cannot be done here efficiently, and we are fortunate to have obtained the best possible opinions on the material collected, much of which is so poorly preserved that only the most expert would venture to describe it.

Since writing the above, I regret to record that news has reached me of the death of Mr. R. B. Newton. The loss of his assistance, based on a very wide experience, will be keenly felt.

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## Reinstatement of an Orang Hulur

*By* W. LINEHAN.

(PLATE II.)

The photograph reproduced is of a document issued in 1878 A. D. by the late Bendahara Ahmad (afterwards Sultan.) It is a certificate that one Hassan of Kuala Pahang, an *orang hulur*, has regained caste.

The document, romanized, reads:—

(Seal.):—

" Ini Tanda
Dato' Bendahara
Sewa Raja Pahang
Sanat 1275

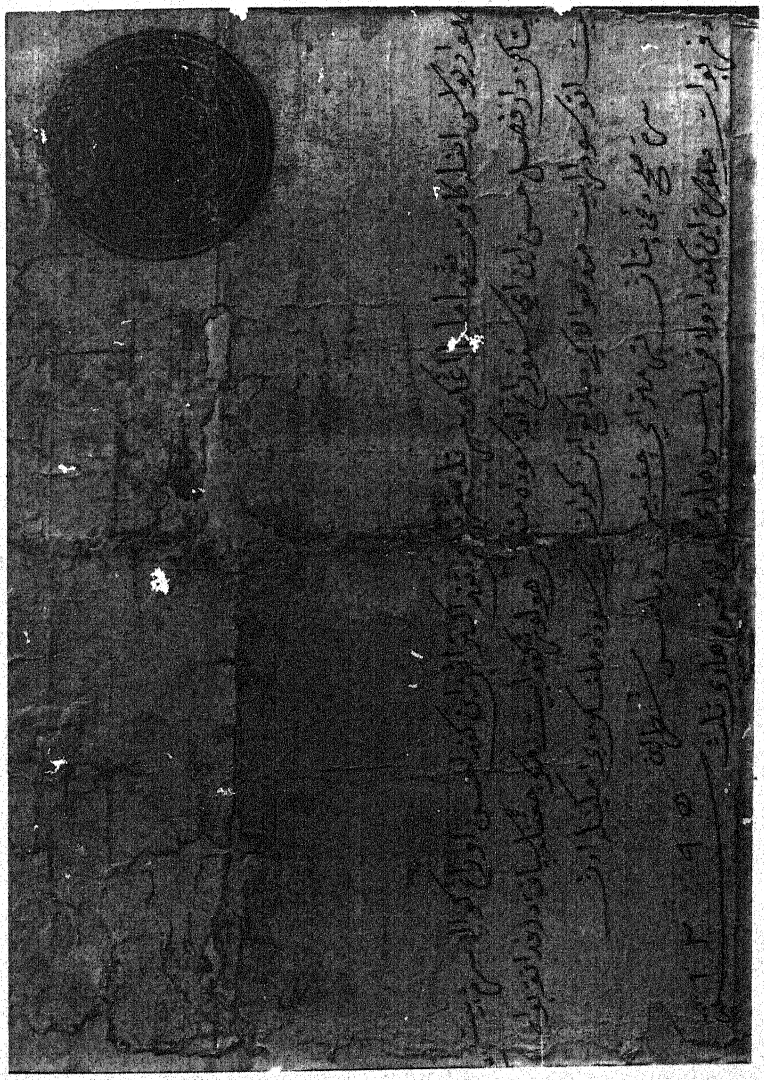
Bahwa dewasa ini-lah Kaus Yang Maha Mulia Engku Besar telah mengurniakan tanda katerangan ini kapada Hassan orang Kuala serta beta menyatakan dari fasal Hassan ini ia sa-orang itu sudah menebus hulur-nya kapada beta, maka jangan-lah siapa-siapa daripada anak buah beta atau saudara beta mendawa lagi di-belakang ini karna beta sudah melepaskan dia demikian-lah ada-nya, serta sah dengan nyata termetraï chap beta di-atas shatar ini.

Di-perbuat surat ini kapada dua-lapan belas hari-bulan Muharram hari Thalatha sanat 1295."

TRANSLATION.

(Seal.):—

" This is the seal
of the Dato Bendahara
Sewa Raja of Pahang.
Date 1275.



CERTIFICATE OF RE-INSTATEMENT OF CASTE OF AN ORANG HULUR.

On this date His Highness the Engku Besar has granted this sealed certificate to Hassan, a man of the Kuala.

Now we hereby proclaim that the aforesaid Hassan has ransomed himself at our hands.

And let none of our people or any of our brothers question this in the future, for we have released him.

This document is truly sealed with our seal, and executed upon the eighteenth day of Muharram, on a Tuesday, in the year 1295."

I am indebted to Haji Abu Bakar, Malay Secretary to His Highness the Sultan of Pahang, for the following explanation of the term *hulur* in the sense in which it appears in the document. The meaning can best be brought out by a comparison of the condition of *orang hulur* with that of *abdi* and *hamba berhutang* under the Bendaharas.

*Abdi* were non-Muhammadan slaves acquired by purchase or captured in war (or the descendants of such persons.) They were often Ethiopians imported from Mecca, or captives from the island of Bali bought in the local slave markets.[1] They had no rights and were treated as mere chattels. *Hamba berhutang* (or *anak mas*) were Malays who had lost their freedom owing to debt. They became serfs to their creditors (*tuan mas*). Theoretically they could neither be bought nor sold, but this rule was not always observed. *Hamba berhutang* occasionally managed to evade the rigours of their condition by putting themselves under the protection of a person of royal rank. They then became *hamba raja,* and very often acquired great power under their royal patrons, which, if Abdullah Munshi is to be believed,[2] was not always exercised for the best.[3] *Orang hulur* were Malays who, having been adjudged insolvent, were declared by the Bendahara to have suffered loss of caste. They did not become slaves like the *hamba berhutang;* they were simply degraded to an inferior status. It was only the raja who had the power to degrade (*hulurkan*), whereas any creditor on affording sufficient proof of non-satisfaction of his debt, could have a debtor declared a *hamba berhutang.*

Both *orang hulur* and *hamba berhutang* involved their families in their fall. Again both classes, unlike the *abdi* could regain status by liquidation of their debt, but in the case of *orang hulur* reinstatement was incomplete without the formal sanction of the Bendahara. *Tebus hulur* was the term used of an *orang hulur* who regained caste.

1. cf. Hikayat Abdullah for a description of a slave market.
2. Pelayaran Abdullah.
3. The condition of *abdi* and *hamba berhutang* is described in paragraph 10 of "The Annual Report for the State of Pahang for the year 1889."

A few points of interest in connection with the seal of the document are not out of place here. The seal bears the date 1275 A.H. (1858 A.D.) and gives Ahmad the style of Bendahara, but it was not until 1863 or 1864 A.D. when Ahmad gained a decisive victory over his nephew Koris (the *Bendahara Muda*), that he became undisputed ruler of Pahang.[4] The wording of the seal shows that Ahmad does not, like his predecessors, purport to derive his authority from Johore.[5]
published in 1897.

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## A Chap Pekak

*By* W. Linehan.

An interesting document was discovered recently at Kuala Anak Endau, Pahang. The document is in the possession of one Mat Tara bin Awang Kechik of that place, and has been in his family for two generations. It is a sealed letter of authority, dated 1260 A. H. (1844 A. D.) from the Bendahara of Pahang to one Talib appointing him head-man over *Orang Laut* in the Sungai Anak Endau, with power of life and death. Such documents, by reason of the wide powers conferred by them, were styled *chap pĕkak*—there was no appeal against acts done under their authority. The "Talib" referred to in the document was a grand-uncle of its present possessor. He was given, as an insignia of rank, a bifurcated spear and a sash (*tetampan*) of yellow silk. These are still in the possession of his grand-nephew. The spear is of Bugis pattern and is styled *tombak berjongkang*.

A romanized version of the Chap is as follows:—

(Seal):—

"Al Wakil

Al Sultan Mahmud Shah
Dato' Bendahara Sewa Raja
ibni Bendahara Paduka Raja
Sanat 1221.

Hajrat al nabi Sal' Allahu Alaihi Wa Sslama kapada tarikh 1260 sa-ribu dua ratus enam puloh tahun kapada tiga-blas haribulan Shawal kapada hari jumaat waktu jam pukul empat petang dewasa ia-itu kaus

4. See Clifford's "Report on the Pahang-Johore Boundary Question"
5. "The State of Pahang was originally a dependency of Johore and governed by a hereditary officer of that Court styled the Bendahara. But for some years past the Bendahara has completely thrown off his allegiance to Johore, and asserted his independence." ("Treaties and Engagement affecting the Malay States and Borneo" edited by Sir W. G. Maxwell and Mr. W. S. Gibson, extract from Colonel Cavenagh's "Report on the Treaties and Engagements with the Native States of the Malayan Peninsula anterior to 1860").

Dato' Bendahara kurniakan tanda chap kapada Talib serta di-kurniai gelar Jenang akan memerentahi segala Suku Biduanda di-dalam Anak Endau, shahadan lagi hendak-lah sakalian mereka Suku Biduanda ikut segala yang di-perentahkan uleh Jenang-ini barang siapa tiada mengikut perentah Jenang ini melainkan derhaka ka-bawah duli Yang di-Pertuan Besar salah kepada beta di-hukumkan sa-penoh-nya di-rampas melawan di-bunoh ada-nya."

TRANSLATION.

"The Representative
of Sultan Mahmud Shah,
Dato Bendahara Sewa Raja
Son of the Bendahara Paduka Raja.
Date 1221.

In the year 1260 (one thousand two hundred and sixty) of the era of the Prophet (to whom God grant blessings and peace!), on the thirteenth day of the month of Shawal, on a Friday, at 4 p.m., His Lordship the Dato Bendahara grants a sealed token to Talib, and invests him with the title of Jenang to rule over all the aborigines in (the vicinity of the river) the Anak Endau.

Now all the aforesaid aborigines are required to obey all the commands of this Jenang. Whosoever refuses to obey the commands of this Jenang is guilty of treason towards His Highness the Sultan, and of an offence against Us; and he shall be punished by total confiscation of his property, and, if he resists, with death."

The "Sultan Mahmud" referred to in the Seal was Sultan of Johore at the end of the eighteenth century. He died about 1810. The "Bendahara Paduka Raja" was Bendahara Ali of Pahang. The date on the seal, 1221 A.H. (1806 A.D.) probably represents the date of his accession to the Bendaharaship.

The "Suku Biduanda" were the tribes of *Orang Laut* who resided in the Sungai Anak Endau. As a distinct people they have now disappeared, and have merged in the Malays. It is not generally known that, at the present day, descendants of the aboriginal *Orang Laut* exist at Kuala Pahang. Until recently they preserved some of their distinctive customs. One type of song and dance known as *bergubang* was peculiar to them. The last exponent of this dance (who is said to have performed before the late Sultan Mahmud) died about six years ago. I have not been able to obtain any further local information about the customs of this interesting people owing to the reluctance of their present day descendants, (now largely merged with the Arab-Malay inhabitants of Kuala Pahang), to admit any knowledge which might betray their affinity with an aboriginal race.

# Tomb-Stones of Muhammad Shah I of Pahang

*By* W. LINEHAN.

(PLATES III & IV.)

A discovery of considerable historical and antiquarian importance was made recently by the writer at Pahang Tua, Pekan District, Pahang. At Dusun Pinang, on the eastern bank of the Pahang Tua river, about half a mile from its junction with the Pahang river, are the head and foot-stones of two graves, a short distance apart.

The stones of one grave are inscribed with prayers in crude Arabic script, the inscription containing neither name nor date.

The stones of the second grave, (with which only it is proposed to deal here), are of the type commonly known as "Achehnese." On examination they were found to contain the epitaph of Muhammad Shah I of Pahang. Each stone is inscribed on all four sides. On one side is written the name of the deceased, his genealogy, and the date of his death; the other sides are filled up with texts from the Koran. The stones are about one foot seven inches high, and three and a half feet apart.

It is curious that no tradition survives of the existence of this monument to the first Sultan of Pahang. The explanation lies perhaps in the fact that successive invasions of Pahang by the Siamese, the Achehnese and the Bugis, as well as numerous internal distrurbances, had the effect of destroying the continuity of the country's history in the minds of the inhabitants. The epitaph on the tomb is historically interesting as being a contemporary record of the first Sultan of Pahang, and as providing a striking corroboration of the genealogy of three Malacca Sultans given in the *Sejarah Melayu.*

Photographs of the faces of the stones, are reproduced. The inscriptions are written in Arabic. I am indebted to Haji Abu Bakar, Malay Secretary to the Sultan of Pahang, for his valuable assistance in deciphering them.

Dr. G. F. Pijper, an Arabic scholar, has been kind enough to furnish the following amended readings of the inscriptions, based on the photographs reproduced:—

"Plate III, Fig. 1. *Small Panel*:—

Muhammad
Al .....

I cannot decipher with certainty the second line. Possibly you may read:

Allāhu 'l-bakā'

(Allah is the durableness), although I cannot discern a ا at the end ( بِقَا or, better, بِقَاْ .) I leave it open.

*Main Panel*:—
Wafātu 'l-Sultāni Muhammad Shāh
Rahimahu 'llāhu 'bni Sultān Mansūr
Shāh 'bni Muzaffar Shāh 'bni Muhammad
Shāh al Marhūmi fī lailati 'l-Khamīsi
Sittata 'ashara yaumin min shahri
Jumādā 'l-awwali sanatun thmānūna
Wa-thamāniyatu mi'atin min hijrati'l
nabawīyati 'l-mustafawīyati.

The Arabic is grammatically not wholly correct. Therefore it is difficult to determine what is the right way to read it. Perhaps it is better to read the last two lines without *i'rāb*, as in spoken Arabic:

Djumādā 'l-awwal sanah thamānūna
Wa-thamāniyah mi'ah min hijrati 'l-nabawīyah
al-mustafawīyah.

But read in any case: *wafātu* (=the passing away of.....); *rahimahu 'llāhu* (= on whom God have mercy). The translation can remain the same.

Plate III, Fig. 2. *Top Panel*:—
Muhammad
Allāhu latīfun.
Quotation from Koran 42: 18:
*Main Panel*:—
Kullu nafsin
dhā'iKatu 'l-mauti
wa-innamā tuwaffauna
ujūrakum yauma
'l-Kiyāmati fa-man
zuhziha 'ani 'l-nāri
wa udKhila 'l-jannata

The words are taken from Koran 3: 182. This verse is very often used on tomb-stones in Mohammedan countries. The text is not quoted in full, but breaks off in the midst of a sentence.

Plate IV, Fig. 3. *Top Panel*:—
Muhammad
Allāhu'l samadu
The words: *Allāhu'l samadu* are taken from Koran 112: 2 (the famous Sūratu 'l iKhlās)
*Main Panel*:—
Allāhu lā
ilāha illā huwa 'l-hayyu
'l-Kayyūmu lā ta'—

Khudhuhu sinatun wa-lā
naumun lahu mā fī
'l-samawāti wa mā

This is the beginning of Koran 2: 256, the so-called "Verse of the Throne" (āyat al Kursī.) It is considered to be one of the most sacred verses of the Koran. The quotation ends abruptly, but is continued on the Main Panel of Fig. 4.

Plate IV, Fig. 4. *Top Panel*:—
Bismi 'llāhi.....

I am willing to read here *bismi 'llāhi 'l-rahmāni,* the first half of the "basmalah," the well-known religious formula, but..... I cannot see it! Let us say that the stone-cutter only imitated some well-known characters, without knowing what they meant.

*Main Panel*:—
fī 'l-ar-*
rdi* man dhā
'lladhī yashfa'u
'indahu illā bi-idh
nihi ya'lamu mā
aidīhim wa mā
Khalfahum wa lā

The context requires *baina,* but it is hardly possible to read it.

The quotation is once more from Koran 2: 256.

The inscriptions on the flanks of the stones (not photographed) must be read, I suppose, as follows:—

Lā ilāha
illā 'llāh Muhammadun
Rasūlu 'llāh.

(The well-known words of the Confession of Faith.)

"The next inscription I cannot reconstruct with certainly. But I propose to read:—

Allāhu Kullu shai'in
Kullun illā huwa bātilun,

which gives a good sense: "Allah is every thing, all except Him is vain."

The last two inscriptions are taken once more from Koran 2: 256.

yuhītūna bi-shai'in
min 'ilmihi illā bi-mā
shā'a wasi'a
Kursīyuhu 'l-sama-
wāti wa'l-arda.

* One r seem superfluous; the word is *'l-ardi.*



FIG. 1.



FIG. 2.

TOMB-STONES OF MUHAMMED SHAH I. OF ~~PENANG~~ PAHANG.



FIG. 3.



FIG. 4.

TOMB-STONES OF MUHAMMED SHAH I. OF ~~PENANG~~ PAHANG.

The fragments of Fig. 3. Main panel, Fig. 4. Main Panel, and these last two must be read in this order."

The inscription shown on Plate III, fig. I may be translated:—

*Top Panel*:—

" Muhammad
God is eternal!"

*Main Panel*:—

" There passed away Sultan Muhammad Shah (on whom God have mercy!), son of Sultan Mansur Shah, the son of the late Mudzaffar Shah, the son of the late Muhammad Shah, (God have pity on them!), on Wednesday night, sixteen days of the month Jumadi'l-Awal, in the year eighty and eight hundred of the era of the Chosen Prophet."

* * *

This epitaph, dated 16th Jumadi'l-Awal, 880 A. H., (17th September 1475 A. D.) is the earliest yet discovered in Pahang, being earlier than that of Raja Fatimah, dated 901 A.H., and of " Marhum " Abdul Jalil, dated 917 A. H.

It is probable that the stones were turned out from the workshop with the texts from the Koran already inscribed. There is a striking difference between the script of the Kuranic texts and, that of the inscription recording name and date. The former is thick and ungainly, and diacritical marks are absent. The latter is finer, diacritical points are brought out, and the letters are well shaped.

It is doubtful whether the tomb-stones really mark the burial-place of Muhammad Shah. They may have been purloined from one of the old recognized royal burial grounds in Pekan Lama. The reasons for this conjecture are:—

(*a*) that there is no *tumulus* where the stones are erected such as one would expect to find marking the graves of royalty, and such as are found in the known royal grave-yards of Pekan, *Makam Chondong, Makam Nibong,* and *Makam Abdul Jalil;*

(*b*) that, prior to the reign of Bendahara Ali (C. 1806—1847 A.D.) who lived at Lami on the Pahang Tua river, there is no record of any place in the vicinity of Pahang Tua having been occupied by Malay royalty;

(c) the complete ignorance of the existence of the tomb-stones (though this is not cogent);

(d) that the removal of tombstones from royal grave-yards in Pekan Lama is not altogether unknown.

On the other hand unmistakeable traces of Siamese occupation have been found in Langgar near Pahang Tua, and Muhammad Shah and his Malays were the successors (leaving out of account the *interregnum* between the expulsion of the Siamese and the

arrival of the first Malay Sultan) of the Siamese. It would have been natural that he should reside, and, after his death, be buried in the region which the Siamese had occupied not long before.

The *Sejarah Melayu* afford some interesting details of this first Sultan of Pahang. He was the son of Sultan Mansur Shah of Malacca and Puteri Wanang Seri the daughter of the captive Siamese Viceroy of Pahang. A youth of unbridled passions, he slaughtered a playmate for an imaginary affront. For this he was declared by his father to have lost his claim to the succession, and was sent to rule over Pahang from which the Siamese had lately been expelled. He took with him one hundred youths and one hundred maidens of noble family to colonize his new country. The boundaries of his territory extended from Sedili Besar to Trengganu. He married Mengindera Puteri, granddaughter of Sultan Iskander of Kelantan, and by her had three children, Raja Ahmad, Raja Jamil and Raja Mahmud. His reign is important in that it marks the permanent colonization of Pahang by the Malays, with the consequent introduction of Muhammadanism into that country.

It is noteworthy that Muhammad Shah predeceased his father whose death did not occur until 1477 A.D., and whose tomb-stone is preserved in Raffles Museum, Singapore.

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## Some Malay Boats and their Uses

*By* H. Goring Dalton.

(Plates V—IX. Text-Figures 1—3.)

There are many different types of Malay boats used round the coasts of the Peninsula but in this article I propose to deal with a few of those most often met with on the East Coast of Johore.

The most primitive form of boat is the dug-out or Jalor (Plate V) which has a very shallow draught and is used almost entirely for river work.

These boats are dug out in one piece from the trunk of a tree, usually a hard wood such as Chengai or Rasak and one or two planks of Seraya are built on round the edge so as to give greater freeboard. They vary in length very considerably, it being usual to find boats anything from 13 feet to 20 feet long by about 3 feet beam. They carry no mast or sail. One or two persons, using paddles, form the crew. These boats with crew draw about a foot of water.

The Malays use them for bringing produce down the rivers, for ferry work and also for fishing with lines.

The fish most frequently caught in this way are Ikan Sembilan (*Plotosus canius*), Ikan Kakap Merah (*Lates calcarifer*), and Ikan Kurau (*Polynemus paradiseus*), the bait used being worms, or Ulat Tanah.

As a rule the Malay who fishes from a Jalor does so in order to feed himself and family and does not sell his fish in the market.

The Malay word for canoe is Kolek and of these canoes there are different types, three of which I propose to discuss here.

The smallest is the island canoe, or Kolek Pulau. These canoes are only about 7 feet long by 2½ feet beam and are comparatively light, the keel being made of Kayu Teruntum, the side planking being built of Kayu Medang. The ends of these boats are curiously turned up in the form of a bow and the whole of the outside is usually painted after Malay fashion in green, blue, red and yellow; or a combination of these colours. They draw about one foot of water and carry one man who sits amidships and uses a double bladed paddle, or Kelibat. They are also provided with a small mast and gaff to which the sail is laced. These small sails are called by the Malays Layar Bulu Ayam and the whole craft with sail can easily be managed by one man, though an inexperienced hand will find the greatest difficulty in keeping these canoes upright in the water even without a sail.

The islanders use these canoes for fishing with lines though they seldom venture far out to sea excepting in very settled weather. It is wonderful, however, what a comparatively rough set the canoes can stand.

Tha fish are caught usually near rocks and coral, the bait used being small slices of fish. Ikan Kerisi (*Synagris notatus*) Sotong (a cuttle fish) and Ikan Chermin (*Caranx gallus*) are amongst the usual catches and, as in the case of those caught from a Jalor, they are seldom sold but eaten by the fishermen themselves.

The next canoe I shall discuss is the Koleh Kelibat (Plate VI, a.) These vary very much in size, being anything from 13 feet long by 2½ feet beam to 17 feet long by 3½ feet beam. This type of canoe is similar to the Koleh Pulau but is much more stoutly built and heavy. The keel and upturned ends are usually made of Kayu Niato with sides of Serayah planking. The bottom is covered with boards as in all these boats. The crew consists of two or three men. The boat draws about 2½ feet of water and is supplied with 3 large paddles (Pengayoh) a rudder with two ropes similar to the ordinary English skiff; also one mast and sail, the latter generally being tanned a rich brown colour by a decoction of the mangrove bark and (or) fruit. The sail has a gaff and boom called Andang Andang.

The men fish from these boats with both net and line. The net Jaring Tamban, is of a very fine mesh. It is 18 feet square, the top edge being attached to floats while the bottom is weighted (fig. 1). A rope is attached to one corner of the net and held by one of the crew. The fish swim into the net, which hangs like a curtain in the sea, and are caught by their gills. The floats are watched and when they begin to sink, indicating a good catch of fish, the net is hauled in. Fish generally caught by net are Ikan Tamban (*Clupea* sp.), and they are sold by the basket-full, fetching about $2 a basket. Fish caught by line include Ikan Parang Parang (*Chirocentrus dorab*), Ikan Merah (*Lutianus* sp.), Ikan Tengiri (*Cybium* sp.), Ikan Ayer (*Thynnus thunnina*), Ikan Lemodok, Ikan Kachang, Ikan Talang (*Chorinemus moadetta*), Ikan Yu (shark, *Carcharias dussumieri*) and Ikan Kerapu (*Epinephelus* sp.).

Next we have the Koleh Pengayer, or Koleh Sa-hari Bulan, so called because its shape represents a new moon or crescent (Plate VII.).

These boats are about 20 feet long with 4½ feet of beam. The keel, bottom and crescent ends are built of Chengai with sides of Serayah. They draw about 3 feet of water and are supplied with three large paddles 4 feet long, a large oar which is used for steering, one mast and a four-sided white sail about 18 feet by 15 feet in size. The sail has a gaff and a boom as in the Kolek Kelebut.

The crew consists of three men as a rule and the boats fish four together in the following manner. A start is made at about 4 a.m. so that they will reach the fishing grounds by 6 a.m. A large stone is tied to a rope at the other end of which is a float. About 6 feet below the float are tied some Nipah palm leaves (fig. 2.) This is thrown overboard in a likely spot and a watch is kept to see if the fish are attracted to the leaves. If not, another place is tried until a large shoal of fish is located. A net called Pukat Tankor about 25 feet square and of one inch mesh is then produced. The four corners are weighted with stones and to each of these a rope is attached. Each boat takes a rope, the net is lowered to one side of the float and the stone is then hauled up a little to allow the net to be passed beneath it. Then all four ropes and the stone are hauled in together thus raising the net to the surface and in this manner the fish are caught.

Ikan Selar (*Caranx kurra*), Ikan Pelila, Ikan Bawal (*Stromataus* sp.), and Ikan Tamban (*Clupea* sp.) are frequently caught in this way. The fish are sold in baskets at about $2.50 each basket.

The largest fishing boat used in these waters is the *Payang* and it is quite the most interesting and picturesque of the series (Plates VIII, IX.).

These boats are about 40 feet in length and draw about 3 feet of water. The bows and stern are built up fantastically giving a most striking appearance. These ends, the keel and bottom planks are built of Chengai, the top planks usually being Serayah. The upper strakes of Malay boats, Timbau, are usually made of such light woods as Serayah or Medang so as to support the crew and nets should the boat be swamped. If built of Chengai only the boat would sink.

The Payang carries two masts and sails, though in a strong wind only one is used. The foremast is called Tiang Topang, the mainmast Tiang Agong, the latter being decidedly bent over at the top to give a certain springiness in meeting the wind. The sails are fitted with gaff and boom as in the larger Kolehs.

The method of lowering the sails is rather peculiar. The end of the boom is fitted with two pieces of wood crossing each other at right angles. These are used like the spokes of a steering wheel and turned over and over, thus rolling up the sail as it is gradually lowered. These spokes are called Achi Achi (plate VI, b.)

Payangs are provided with thirteen or fourteen oars, four or five paddles, or Pengayoh, and one large oar, Kemudi Sepak, which is used for steering. They carry a small boat, Sampan Payang, about 6 feet long by 2 feet beam, and an anchor. Near the bows is fixed a curiously carved figure-head usually rather like the head of a dragon and fantastically painted. The bow is also decorated by a necklace made from the Pinang tree called Mayang Pinang.

In addition to these items one or two long poles are carried for use in shallow water, a small landing net and a wire hoop strung with cockle shells (Kulit Krang) on the end of a stick. This last is used for frightening the fish into the net by shaking it under the water when it makes a rattling sound.

The crew consists of about 14 men. A large net, Pukat Petarang, is used measuring about 110 to 120 feet long by 18 feet wide (fig. 3.).

The shape is peculiar. The inboard ends are of a very wide mesh and appear in the form of long arms. About half way down, the mesh becomes smaller, about 2 inches in size, until the arms meet the main portion of the net which is enclosed forming a sort of pipe. Here the mesh is only ¾ inch in size. The end of the net is tied up thus closing it and forming a purse. The lower side of the entrance to the net is weighted with five large stones. Each arm of the net has three ropes attached for hauling in and an extra rope at the end.

The boat sails to the fishing ground about 2 a.m., and on arrival at what is considered a suitable spot one man shoves off in the little sampan, jumps into the water and listens for the fish.

If the fish are in numbers a noise similar to surf on the beach is heard. Then is the time for the net to be lowered into the water. The fish are usually at the bottom and are frightened into the net by the vigorous use of the Kulit Krang and the men knocking their paddles on the sides of the boat. The inboard pair of ropes attached to the net is then hauled in until the next pair is reached. This is taken hold of and hauled in and so on until the whole net is on board and the fish removed.

The boats return about 3 or 4 p.m., and if they have made a good catch a small flag on a stick is hoisted in the bows as a signal to the crowd anxiously waiting on the shore. If an exceptionally good catch has been made two flags are hoisted. On these occasions the wife of the Juru Selam, or captain of the boat, comes down to the waterside carrying a basket containing dry rice which she sprinkles liberally over the boat, crew, fish and anything that comes in her way.

Many kinds of fish are caught, but Ikan Gelama (*Sciaena* sp.) and Ikan Duri (*Macrones nemurus*) are the kinds most sought after.

During the North-east Monsoon Ikan Gelama leave the East Coast and the Payangs are then either laid up ashore, or sail down to Singapore and up the West Coast where the fishing is still good.

One may be surprised to see many people helping themselves to small fish brought in by the Payang, without asking, or giving a word of thanks. Nothing is ever said however, the pride of the Malay being far above quibbling over such a small matter. The larger fish are sold separately unless needed by the members of the crew.

A few general remarks about life in the fishing-boats may not be out of place.

The crew generally wear curiously shaped conical hats, Terendak, made of Serdang leaf, which are light and give a very good shade from the sun and from the glare from the sea. Shoes and boots are never worn in the boats for fear of Ribut, or squalls, and also in the belief that if worn there will be no fish caught. This of course also applies to visitors who might venture on a fishing expedition.

Whistling and singing in the boats is also forbidden for the same reasons and also for fear that a shark may attack the man who is listening for the fish from the sampan.

The fishermen are drawn from various parts of the Peninsula, but more particularly from Trengganu and Kelantan. These people do not confine themselves to their own states, many being now resident on the East Coast of Johore solely for the purpose of fishing. The coast between Endau and Sedili is comparatively

well protected from bad weather and this possibly is a consideration even with these hardy people.

The launching of a new Payang is ceremonious and not to be passed over lightly. All the gear for the fishing trip is first stored in the boat and the crew and their friends assemble for the usual Kenduri, or feast. After a few prayers have been said by the senior member of the assembly a light meal is taken and some uncooked rice is sprinkled on the bow and stern platforms which are situated just below the upturned ends. The Payang is then sprinkled with Tepong Tawar, a kind of flour, the necklace, or Pinang Mayang, is then suspended from the upturned prow and the boat is launched by willing hands on her first cruise.

There are two other boats frequently met with on the East Coast, but which have nothing to do with fishing.

The first is the Beda, or Prahu, a big cargo boat usually fitted with one mast and a big lug sail. These boats are supplied with oars and are used entirely for transporting cargo of various kinds. They vary tremendously in shape, size and build so that a detailed description would be difficult.

The last boats I shall mention are what are called locally Prahu Pinnace and Prahu Denah. These boats are built rather similarly to the Bedas and come down from Trengganu, Kelantan and Patani laden with rice. They vary very much in size, the largest being several tons burthen.

The smaller ones carry 6 to 8 men, and draw about 5' feet of water, the length being about 25 feet with 6 feet beam. These boats do not carry oars or paddles but use long poles, Galah, for helping them in and out of the rivers.

They are fitted with two masts, the foremost being raked well forward giving a most picturesque appearance. The sails, which are frequently made of matting, are stiffened with lengths of wood called Andang, similar in appearance to those used by the Chinese tongkangs which are such a familiar sight all round these coasts. Prahu Denah are the largest boats and carry 10 to 12 men as crew.

Malay boats having such shallow draught will not sail close to the wind, but before a stiff breeze they are very speedy. When on the wind the crew frequently ballast the boat by standing up on the gunwale and leaning well outboard from the weather side, while the boat is heeled over to leeward almost on her beam ends.

(I should like to express my thanks to Mr. C. N. Maxwell for his kindness in criticising this paper and for suggesting one or two improvements.)

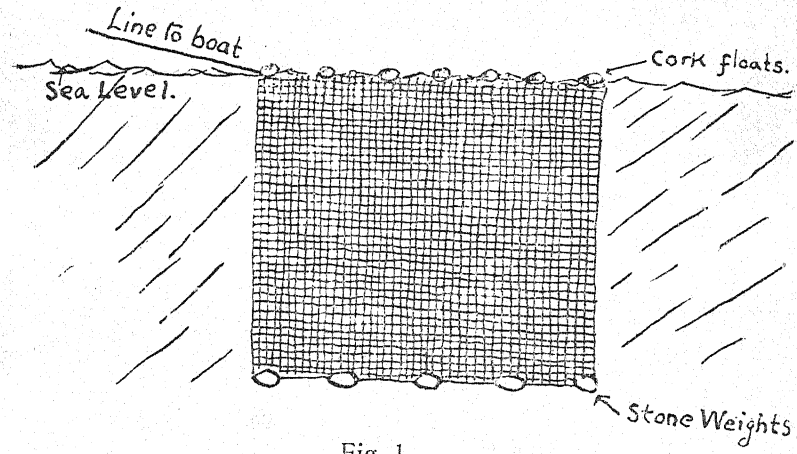

Line to boat
Sea Level.
Cork floats.
Stone Weights

Fig. 1.

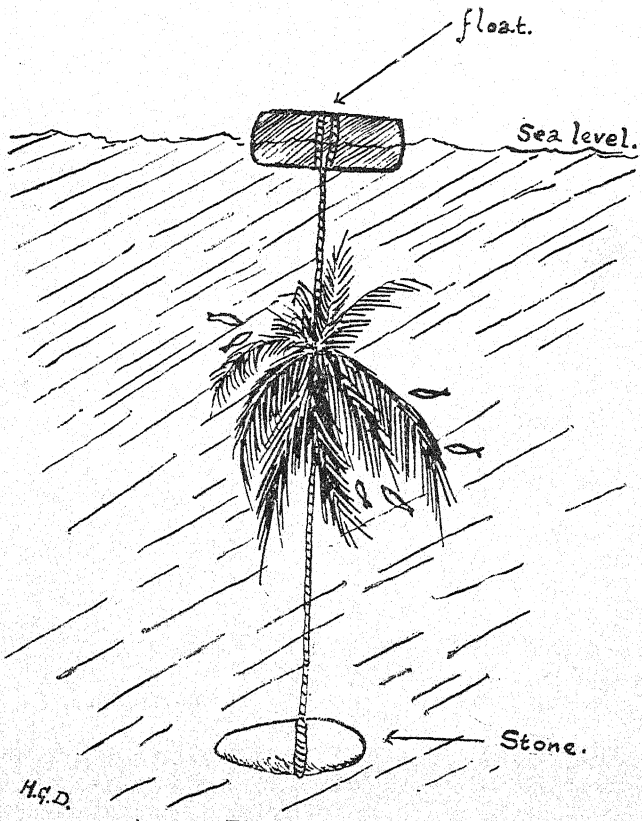
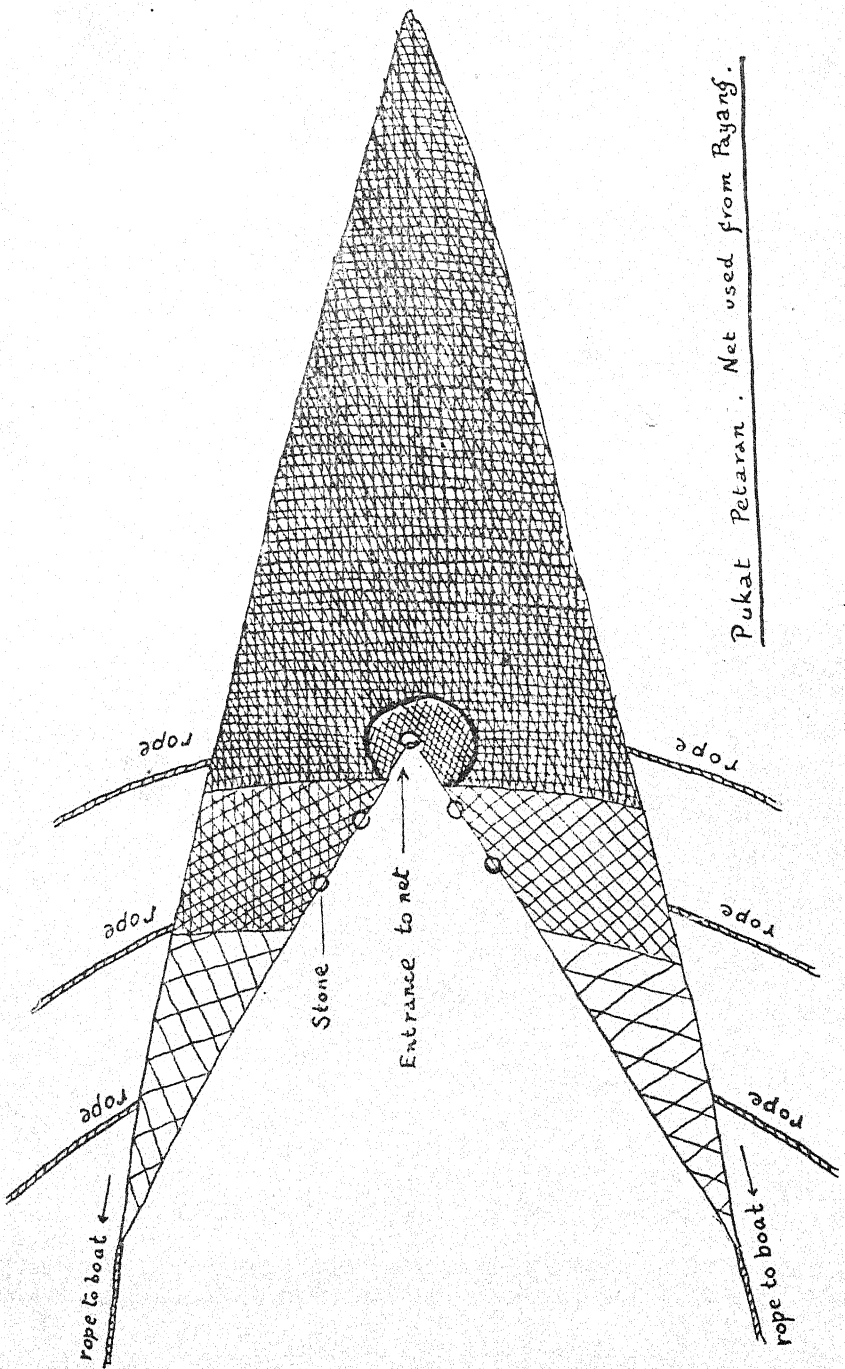
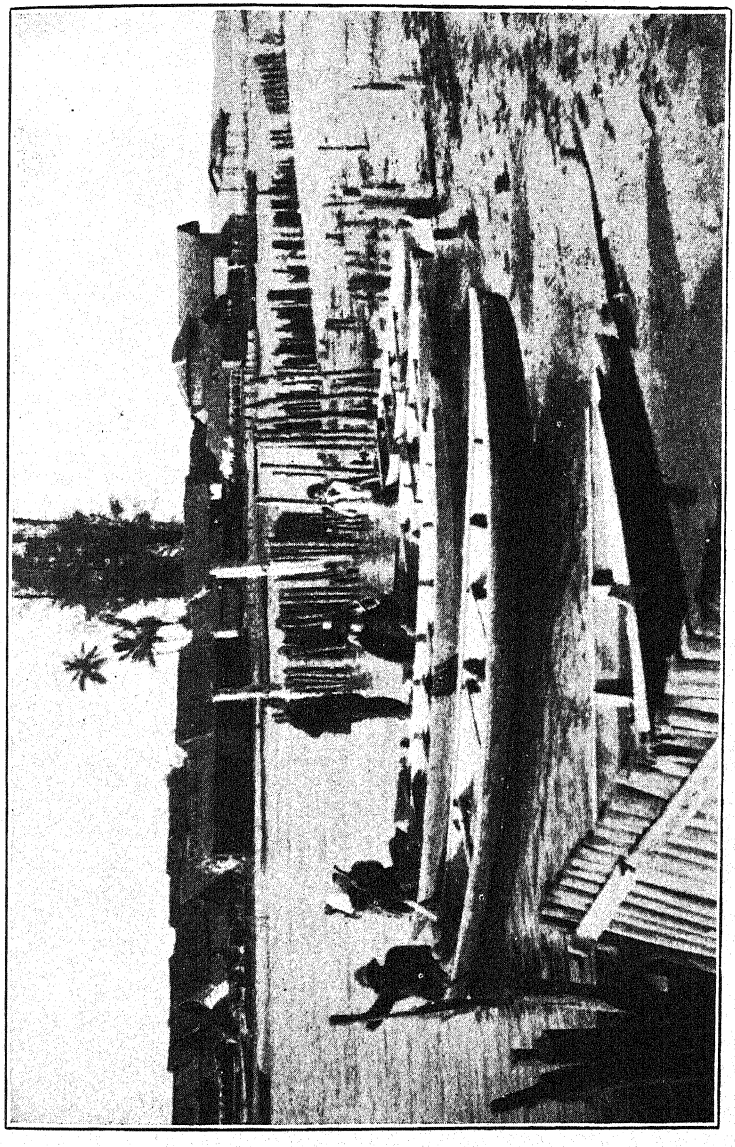

float.
Sea level.
Stone.
H.G.D.

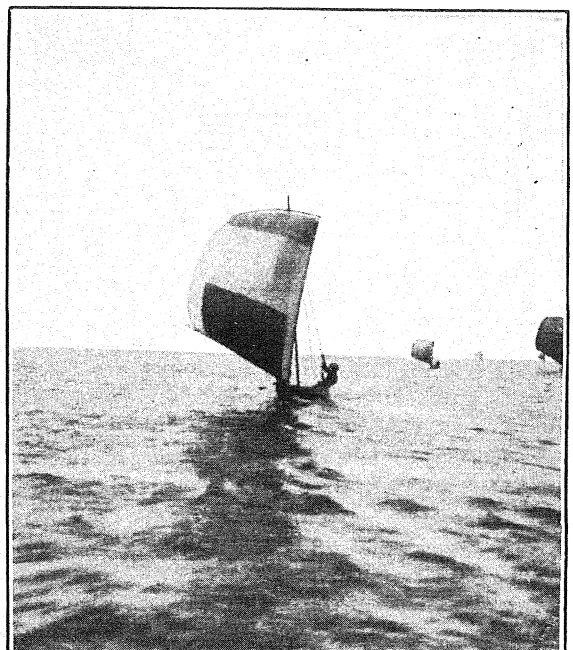
Fig. 2.

Dalton Fig. 3.

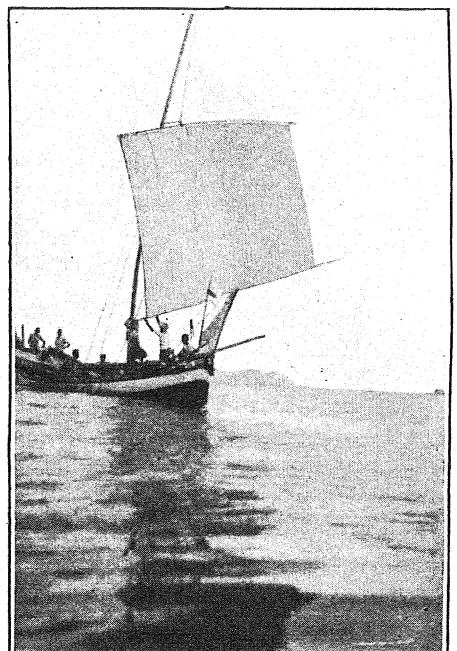

Pukat Petaran . Net used from Rayang.
rope
rope
rope
rope
rope
rope
Stone
Entrance to net
rope to boat
rope to boat



MALAY JALOR, OR DUG-OUT CANOES.

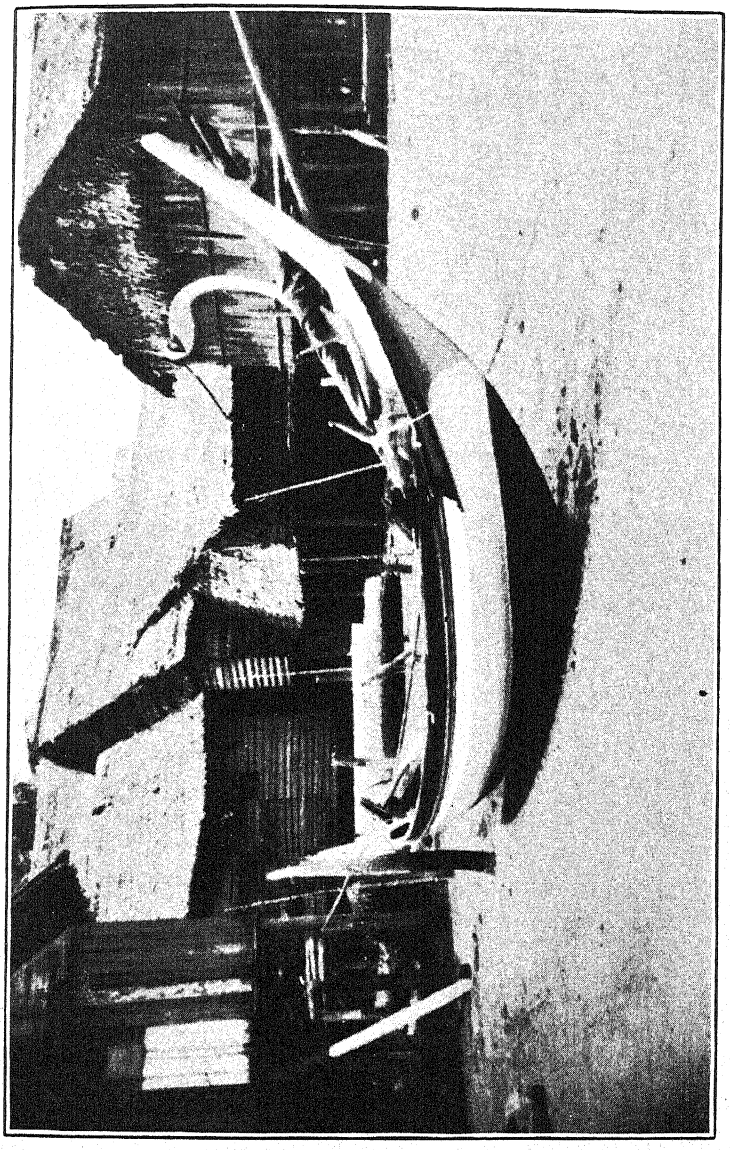


KOLEH KELIBAT.



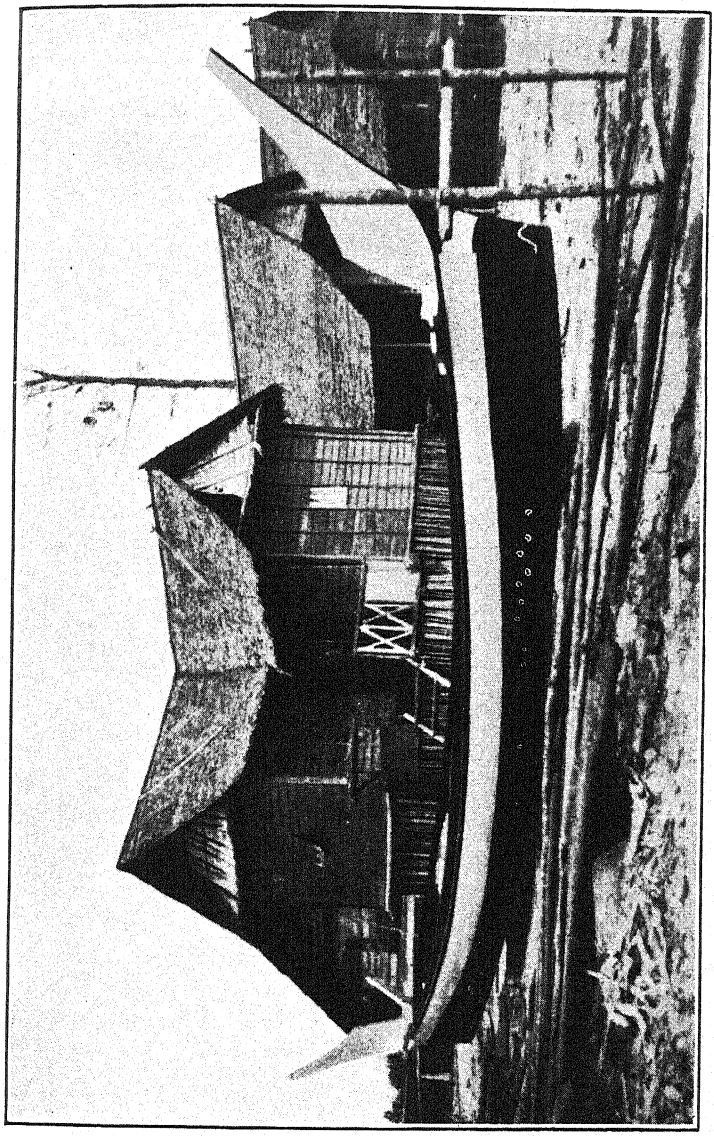
ROLLER-REEFING THE SAIL OF A PAYANG.



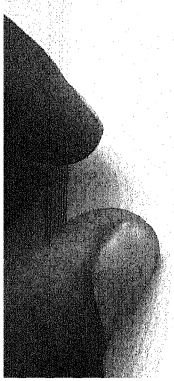


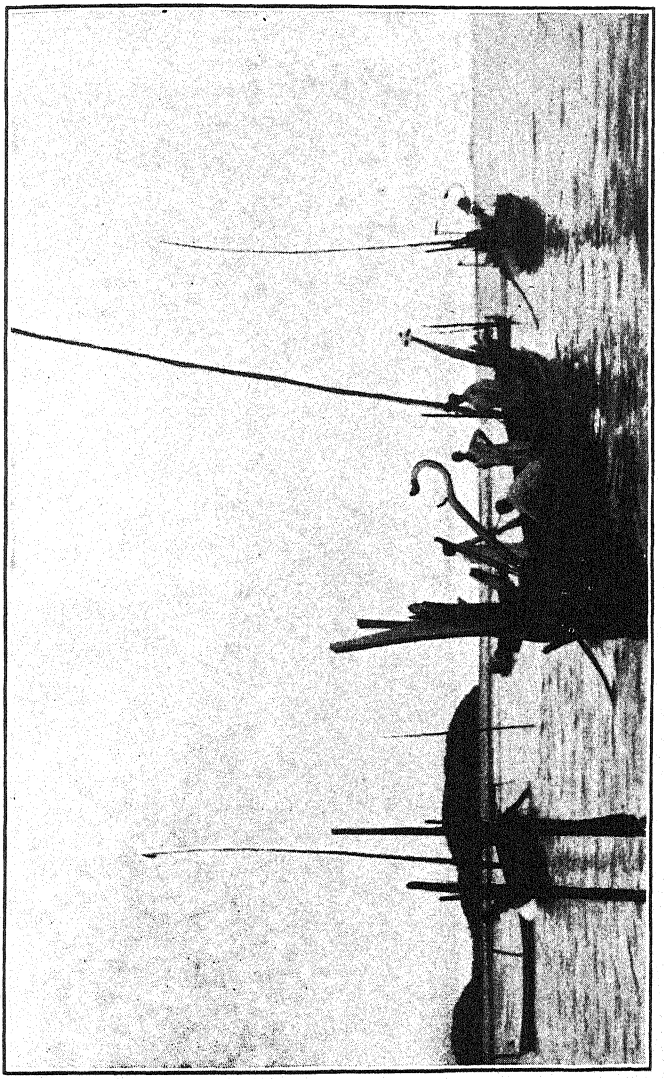
KOLEH PENGAYER.



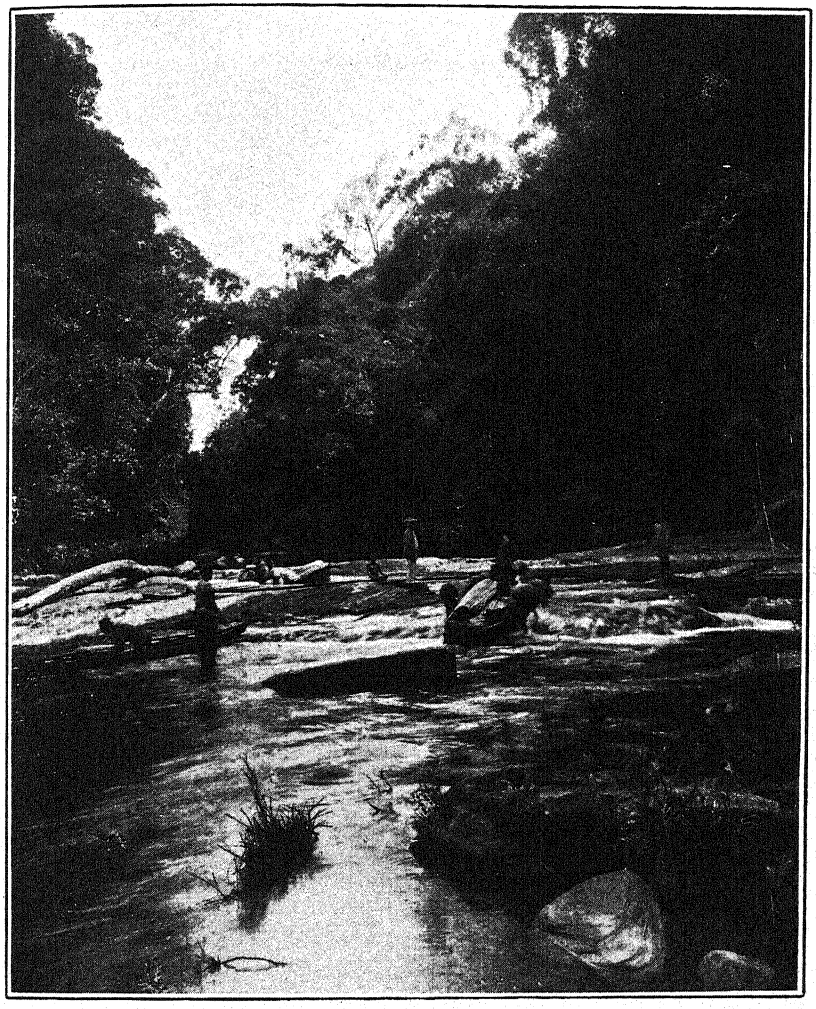


A NEW PAYANG.





PAYANG WITH CURVED MASTS.



JERAM PANJANG RAPIDS IN SUNGAI SEKIN, S.E. PAHANG.



ULU KACHA, BETWEEN BUKIT MISEMAH AND BUKIT PANJANG, S.E. PAHANG.





GUNONG LESONG FROM BUKIT PANJANG, S.E. PAHANG.



WATERFALLS, ULU SUNGAI KUKAI, S.E. PAHANG.

# A Journey in the Ulu Rompin District, Southeast Pahang

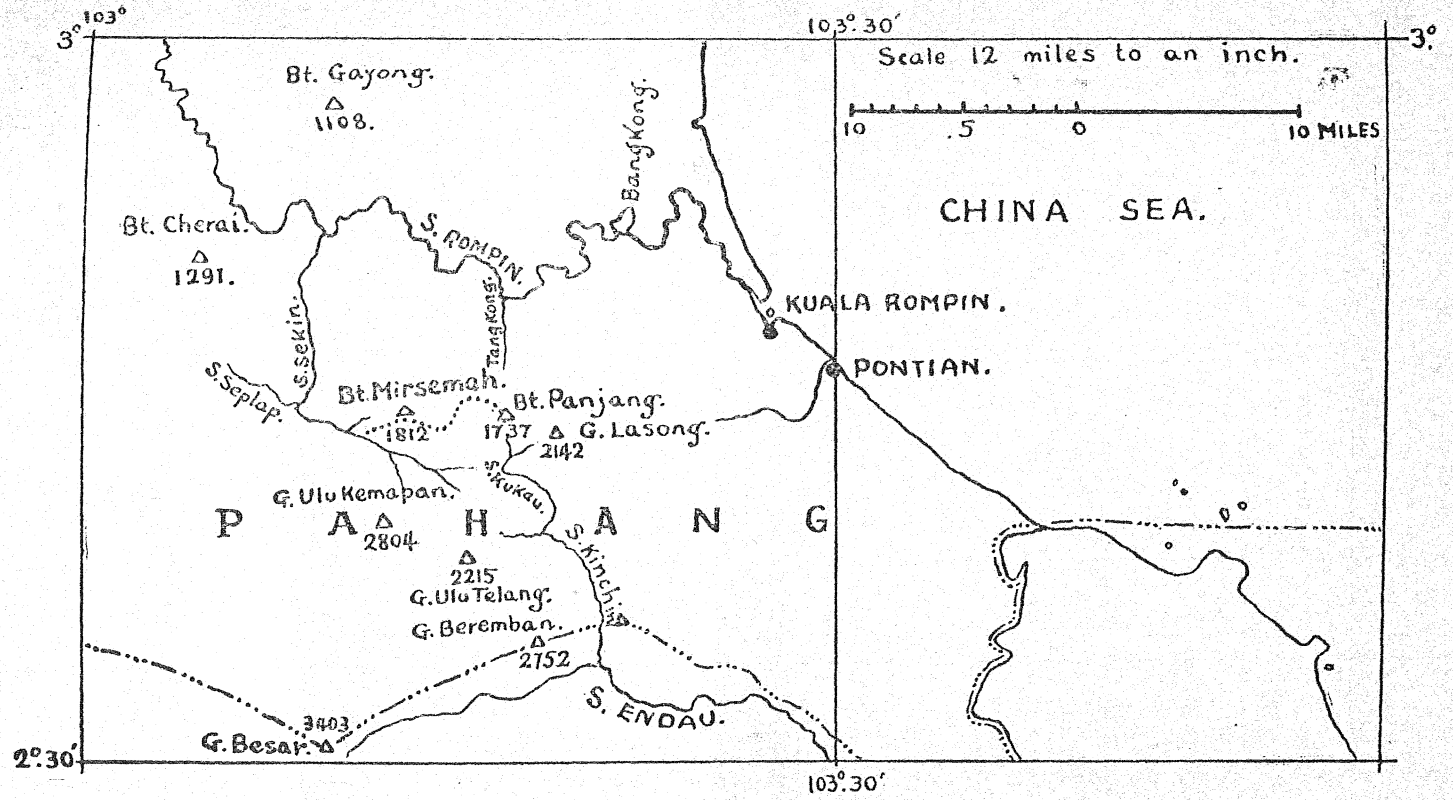
*By* E. S. WILLBOURN.

(PLATES X—XIII AND MAP.)

It is thought that the following account will be interesting because it deals with a section of country which is very little known. The accompanying sketch map gives a rough idea of the district examined, and the "Reconnaissance Map, South East Pahang, 2 miles to an inch," obtainable from the Survey Office, Kuala Lumpur, gives more detail. Sungai (River) Rompin itself is a regular thoroughfare for Malays, Chinese, and Jakuns,[1] but the tributary, Sungai Sekin, is less frequented. Occasionally parties of Malays go several hours' journey up the stream, cutting bamboos, which they can sell to a Chinese dealer at three cents a piece, but they do not go above the rapids. They travel in dug-outs, families of men, women, and children, and they live for a week or so in huts on poles raised from the ground, built on the side of a steep bank for preference, where marauding elephants are least likely to molest them. On my return downstream I met such a party, the men busy collecting bamboos while the women and children were enjoying themselves bathing. A tribe of Jakuns, numbering perhaps twenty all told, lives on the banks of Sungai Sekin about half an hour's paddle upstream from the mouth, and they sometimes go a day's journey up the river to spear fish. Penghulu, Batin, and Pak Yatin, alone of my party, had been above Sungai Perpati, and this had been many years before, when they were children.

My coolies told me that Forest Department Malays had travelled from Sungai Haha to Bukit Mirsemah, Bukit Panjang, and Sungai Kukau, at the time when the Forest Reserve Rentis,[2] was being cut, and Batin was very reminiscent about their troubles on that occasion; how all their food ran out while they were at the waterfalls of Sungai Kukau, and how they set off, intending to reach Sungai Sekin in one day. But the party were so tired when they reached Ulu Kachah, between Bukit (Hill) Panjang and Bukit Mirsemah, that they preferred to lie down and sleep with empty stomachs. Che Lambak, Assistant District officer of Pekan, tells me that he too has done this trip when inspecting the Rentis. The surveyors who made the observations from which the Reconnaissance Map was compiled visited Bukit Mirsemah and Bukit Panjang, but they had not been in Ulu Sekin. I gathered that no one had ever before ascended Gunong (Mount)

1. Aborigines of the district.
2. Trace through forest.




Willbourn Map.

Ulu Telang on the north side, and that the ridge running east from Gunong Ulu Kinchin to the unnamed hill 1586 feet high had never been visited. This ridge is not marked on the small sketch map; it lies about two miles south from Bukit Panjang. It will occur to the reader that a long time was spent in covering a very small distance, and of course, this is certainly the case. As soon as one leaves a well-defined track or river one must cease to reckon in miles, or the amount of progress made will seem ridiculously small. In jungle-covered mountainous country it may not be possible to go more than one or two miles in a day.

I left Mersing, Johore, for Kuala Rompin, in Southeast Pahang, at about 9 o'clock on the morning of July 15th, 1925, in a *bedak*, a small two masted sailing boat, with a crew of four men. I had Ah San, my Hylam boy, with me. Mayah, my Malay Collector, had gone three days before by steamer from Singapore, with instructions to arrange for coolies and boats as soon as he should reach Kuala Rompin. As we were favoured with a steady south wind, usual for this time of the year, it took us only seven hours to come to Kuala Rompin. It was annoying to find that Mayah had arrived only three hours before, and had therefore not been able to get everything ready for a start upstream on the morrow. The *s.s. Mahidol* had not put in at Rompin on her way up the coast, and Mayah had been cruising up to Kuantan and back while I had pictured him as getting rid of all the irritating business of bargaining with coolies and boat owners. Several days elapsed before I could find ten Malays who would go with me for a dollar a day, or hire two suitable boats, and it was only through the good offices of Che Lambak, Assistant District Officer, Pekan, that I got away as early as I did. Some four or five years previously, a visitor to Pontian, who had required coolies for a few days, had very unwisely given them $1.50 each per day, together with their food, and when arranging my different expeditions in this part of the country, I suffered very vexatious delays in getting together gangs of men, because of their quite natural desire to get big money again. During my enforced stay in Kuala Rompin I had quite good sport with *punai* (green pigeon), particularly on the north side of the river, opposite to Pulau Lang.

We made a start upstream on July 18th, and encamped on the bank at about 5 o'clock, at Pahon, some miles below Bangkong. I had brought two canvas sheets with me, twelve feet square. Each of these was slung across a horizontal pole lashed at either end to vertical posts at a height of six feet from the ground. The simple tents so made were open at the ends, and the sides reached to a distance of about two feet from the ground. As they were used almost solely in jungle, where the rain falls vertically, they were just as effective in protecting one from the weather as a more elaborate tent, and they gave better ventilation. Before

turning in I managed to bag several *pergam* (imperial pigeon) which were good eating for us all. I had brought a few live chickens with me, and throughout the trip I used no tinned meat so long as I had fresh meat, fish or fowl. I had a camp-bed and mosquito net, and as this part of Sungai Rompin swarms with mosquitoes at night time, I went very early to bed. A month later, when coming downstream, I stopped at this place again to camp, and incautiously postponed my bath until dusk. It is not safe to jump into the river here on account of crocodiles, and so I had to balance on the end of a boat and hoist the water up using a dipper with a length of rattan attached. This necessarily took time, and during the few minutes between undressing and dressing again I was punctured hundreds of times by crowds of ravenous mosquitoes. My coolies spent a very restless night here, and were glad to move on.

Next day we continued rowing upstream, passing the abandoned Arghan fibre plantation at about nine o'clock. A few hundred acres of *belukar* (secondary growth) now represent what was once a busy estate employing five Europeans and several hundreds of coolies. We rowed on until 6 p.m., when we reached Sedong, near Kuala Tanggong, where there is an old wooden jetty formerly used by Chinese wood-cutters as a mooring place for their tongkangs loading up with *balau* logs. We were rather afraid of falling through the rotten timbers into the river, and as the banks were low and marshy, we slept in the two boats, packed together like sardines. This turned out to be rather lucky, for at 10.30 p.m., we were awakened by the approach of a tug (Flower III) towing a tongkang[3] and Che Lambak's house-boat upstream. We hailed them, were taken in tow, and went along at a fine pace until we reached the wood-cutters' camp for which the tongkang was bound, and there halted for the remainder of the night. Next morning we were towed as far as Batu Ampar, the limit of navigation for the tug, and then continued upstream under our own man-power as far as Kuala Sekin, stopping at Tilan to tell some Jakun that we wanted men and boats to take us up Sungai Sekin. Thanks to Che Lambak, I had no difficulty in getting what I required. There is a Forest Checking Station at Tilan, with two Malays in charge, and a number of Jakuns live in clearings scattered round about. Batin Gayong, their chief, came with me bringing several of his followers. Che Lambak spent the night with us at Kuala Sekin, and one of his Malays had a *jala* (casting net) with which he caught about thirty or forty pounds of *ikan batu* with only three throws. *Ikan batu* vary in weight up to about half a pound, so they were too small to be speared except by a specially small *serampang* (fishing spear with several prongs), and on seeing the swarms of them in Sungai Sekin later, we often regretted that we had no *jala* with us. I

3. Chinese sailing vessel, or lighter.

parted from Che Lambak when he continued up Sungai Rompin, and during this day, while the Jakuns were being sent for, I went three hours further up the Rompin river, and climbed Bukit Cherai. We disturbed some pig near the foot of the hill, but I was too slow to get a shot at them. When we returned we found quite a large gathering of Jakuns with boats at the Kuala Sekin sandbank, and I bought fowls and eggs from them for my larder.

The next morning, July 22nd, we set off up Sungai Sekin in six small boats, the two larger boats being now discarded on account of the shallow water (plate X). I had ten Jakuns as well as the ten Malays, and very useful fellows they proved themselves to be. Their wages were fixed at 60 cents a day, and I gave them rice, dried fish, tobacco, and matches in addition. The party kept in good health all the time, owing to the good food, and I didn't prescribe more than 30 grains of quinine during the trip, the whole of which went to Ah San to cure a bad cold that he had got before we started. There were lots of bruises and sores to be dealt with at different times, but everyone seemed to be satisfied with vaseline as a cure for all such ills.

Half an hour up Sungai Sekin from its *kuala* (mouth), we came to a Jakun clearing with the Batin's house on the river bank. The Batin (a class of headman) was going with me, and after leaving a stick of tobacco with his old wife, we went on. A quarter of an hour's poling brought us to a spot where three Jakun women were spreading slices of tapioca root on a rock in mid-stream, to be dried by the sun, and we met no other people for the next two weeks, when we were coming downstream and passed a party of Malays cutting bamboos a few miles above this spot. All day long we found abundant recent signs of elephants. At many places the low clay banks had been gouged and scarred by their tusks in a very thorough fashion and the Jakuns said there were *gajah jahat* (wicked elephants) about. Every fifty yards or so was a well-worn track coming to the water's edge on either bank, where elephants had crossed the stream. At one time we heard a noise ahead of us, which the coolies said was an elephant wading upstream, and, sure enough, five minutes later, we came to his great foot-prints in the stream bed, and little eddies of sand still showing in the water above them from his movement. We called a halt at Kuala Seplap and had a very comfortable night on the sandbank there, in spite of the elephants that we pictured as roaming about in the jungle all around us.

The Jakuns had already speared several fish, but our next day brought us much better conditions for this wonderful sport. As far as Kuala Seplap the water had been rather cloudy, and it was difficult to see the fish. Further up the water was like crystal, and when we came to the deeper pools the fun was fast and furious. With our six dugouts we were able to manoeuvre so

that the fish had to swim near to some one or other of us, and sometimes it was possible to send a couple of the boats to the shallow water above a pool, to leave two more in the shallow below, and then to send the other two into the pool to start the fun agoing. I had two Jakuns, Prentas and Kuda, standing in the prow of my dugout, poling, and the head man of the Rompin Jakuns, known as Penghulu, was my steersman. On seeing a *tengas* or a *sebarau*, Prentas would lay his pole aside and pick up the *serampang*, a three-pronged fish-spear designed after the same style as Britannia's trident. It was seldom that he had time to take deliberate aim before lunging. Usually the *tengas* or *sebarau* had to be taken on the move, and it was a clever man that succeeded in getting more than one fish out of ten attempts. Sometimes sluggish fish, such as *bujok*, would be detected half asleep on a muddy patch of the stream-bed, and these were easy game, for it was possible to glide in the dug-out directly above the spot, and to bring the *serampang* slowly to within a few inches of the fish, before making the final swift thrust. A one pound *bujok* was my own first victim, and for several days I had perforce to be content with this and similar lazy fish. Before the trip was over I succeeded in killing a *tengas*, and I felt that this was something to be really pleased about, for there was nothing sluggish about him. My Jakuns were very clever at the game. One evening three of them got twenty fish in two hours, including one magnificent seven pound *sebarau* and four others each weighing about three pounds. The Malays were not used to it, and were as awkward as I was.

On July 24th we left the boats, and followed the Forest Reserve rentis which leads from near Kuala Haha to Bukit Mirsemah, Bukit Panjang, and Ulu Sungai Kukau (Kuku on the Reconnaissance map). The coolies made a shelter, near the top of the steep river bank, in which we left all our food and stores, except sufficient to last us for four days, and the position of the shelter was so contrived as to make it as difficult as possible for elephants to reach. Without spending longer than we wanted in building a platform in high trees it was impossible to make the food-depot quite safe, but, as events turned out, it was safe enough, for although elephants waded in the stream past the place while we were away, they evidently did not see the platform because it was above their heads.

My coolies, laden as they were, had a hard climb to get to the top of Bukit Mirsemah. This hill is 1812 feet high, and like many another quartzite hill, it has very steep slopes, so we were all glad to sit down for a spell and take things easily when we reached the top. The coolies soon cleared away the *belukar*, and I got a good idea of the surrounding country. The steep ridge extending from Bukit Linau to Bukit Keniai was the prominent feature on the northern and the northwest sides. My view in a

south easterly direction was obstructed by jungle. Gunong Beremban was the landmark in the southeast, and the tall single tree which serves as a survey beacon on Gunong Ulu Kemapan was conspicuous in the south. Far beyond the southern slopes of Bukit Embaju, I could just distinguish Gunong Ledang (Mt. Ophir) in Malacca, faintly visible in the clouds, towering up above an extensive plain. A thunderstorm came on while we were still on the top of Mirsemah, so we opened out one of the canvas sheets, and the whole party of us managed to crowd under it to keep the baggage dry. As soon as the rain had stopped we set off again, following the *rentis*, which runs in a general easterly direction along the top of a ridge from Bukit Mirsemah without any appreciable rise or fall, and in the evening we pitched our camp near the source of Sungai Kachah, just below a beautiful little waterfall (plate XI.)

Next day we went along to the cleared place on the ridge known as Bukit Panjang, and from here we got a fine view of the plain which extends in a northerly direction towards Sungai Pahang, with only occasional low hills to break the monotony. Flat-topped Gunong Lesong (plate XII) rather south of east from me, was a splendid sight. We went downhill from Bukit Panjang until we came to Sungai Kukau, and there camped in a most beautiful spot, with magnificent waterfalls above and below us. There is a series of eight grand falls of quartz-porphyry, with a total height of considerably more than a thousand feet, surely one of the most beautiful sights in the Peninsula (plate XIII).

On July 26th I climbed on to the ridge which extends for several miles east from Gunong Ulu Kinchin to an unnamed hill 1586 feet high. My Jakuns had never been here before, and we had an interesting time in this hitherto unknown spot. The uppermost 400 feet or so of the ridge was a perpendicular quartzite cliff, with no friendly trees to give us hand or foot hold, and it took an hour to find a way up. Having got there we all felt that it would be even more difficult to climb down, so we walked along the ridge for about a mile due west, and then began the descent. At first it was easy, because there were plenty of trees and shrubs growing in fissures and cracks on the cliff face. Then, after descending several hundreds of feet, more than enough to make the prospect of climbing back again to the ridge most distasteful, we reached a ledge below which was a sheer drop of four hundred feet. We walked along it for perhaps a quarter of a mile, and were then brought to a halt by a waterfall, coming over the cliffs from a considerable height above, and falling vertically three hundred feet below us. At first sight there seemed to be nothing for it but a very tiresome return to whence we came, but the enterprising Pak Yatin crept alongside the fall and found that the splashing of the water had cut back into the cliff behind the curtain of water, and that it was possible to crawl along the ledge behind

it. We all did this, and having got clear, we were very relieved that the loose blocks of quartzite forming the roof above us had not fallen on us. Almost at once we met another difficulty, for, a few chains further along, the ledge came to full stop, and there was no going any further. This was the more tantalising because we could see a spot only forty feet below us from which there was a shelving jungle-clad descent, so that, but for this forty feet, our troubles were over. Penghulu decided that we should make a ladder, and he told his very active fellow Jakuns to climb down to the slope below, using a convenient creeper as a rope, and there to fell two trees. I would have preferred to spend several hours retracing my steps to the known difficult place up which we had ascended earlier on the morning, rather than have trusted myself to that frail creeper, but the Jakuns managed to get down in safety. It was a slow business making the ladder, and we were annoyed by a score or so of *penyengat*, wasp-like creatures that can give a most painful sting. Prentas got one sting in his ear, so we retreated a few yards backwards along the ledge, and sat or lay down, keeping as still as possible. It took one and a half hours to built a ladder but only about one and a half minutes to descend it, and, having reached the sloping ground, we soon got back to our beautiful waterfall camp where I enjoyed a splendid bathe.

While I had been exploring the cliffs, Mayah and six coolies had walked downstream as far as Sungai Puan, collecting information which proved very useful, and another party had been exploring the waterfalls upstream. They were away for the greater part of the day, and had climbed up alongside six big falls, which, with the two below our camp, must have represented a height of 1500 feet or thereabouts.

On July 27th, we climbed back to the top of Bukit Panjang again, and pitched camp near the little waterfall where we had been two nights before. It rained all the afternoon, giving us all a depressing sort of evening. During the night I got out of bed, and had hardly put my feet to the ground when both insteps received a broadside of stings. I instantly jumped to the conclusion that there were *penyengat* (small wasps) about, and dived under the mosquito net again, there to stay until dawn. Later, next day, I got just the same stings again on my bare feet, and I now found that they were *semut api* (fire ants), not *penyengat*. For a short time the sting of one is as painful as the other, but the pain of *semut api* very quickly passes off.

On the 29th we came up Sungai Sekin to Sungai Perpati, beyond which our boats could not go, so we camped shortly after noon, and got ready a cache for leaving our surplus stores on the morrow. We brought enough food for five days, and set off walking upstream, our aim being to find a ridge, which we had seen from the top of Bukit Mirsemah, and walk up it to Gunong

Ulu Kemapan. Very few people had been so far up Ulu Sekin before, and certainly no one had left the stream to go up Gunong Ulu Kemapan from this side. Our difficulty would be to recognise when we had reached the spot where the slope of the ridge came to the stream, and, once we had left Sungai Sekin, we should find it much harder to keep going in the right direction.

Large fish were becoming scarce, as there was hardly enough water for them, but it was today that I succeeded in killing my *tengas*. Later, while I was searching a pool for hiding fish, Sidi came running up with my shot gun, to say there was a rhinoceros asleep on the river bank, a short distance away, and would I come and shoot it. I walked along to see it, but explained as I went that I would not shoot as I had no big game licence. Great was the disappointment! Batin looked reproachfully at me, and Penghulu was eloquent with his entreaties. Then he said "If the Tuan won't shoot it I am going to *tikam* (stab) it with my *parang* (cutlass)," and, sure enough, he dashed off waving his parang, and obviously worked up to a great state of excitement. We were only a hundred yards from the sleeping animal by this time, so I slipped a pair of buck shot cartridges into my gun for fear of accidents. Suddenly Pak Yatin shouted out that it was not a rhinoceros at all, but a *seladang* (gaur or bison) Wah! Seven of my Malays climbed a tree, and everyone began to treat the affair more seriously. Penghulu stopped his rush, and had no more desire to use his *parang*. We walked a little nearer, to have a closer look, and I began to question Penghulu about it. "Is it that round brown object, looking like a tree trunk, with a patch of black at one side?" Yes, that was it, and the dark patch was its head. Suddenly Ninto, the humorist of the Malays said, "Well, Tuan, if you won't shoot, let's see it move," and he picked up a boulder and hurled it hard at the *seladang*. Not a movement! It *was* a tree trunk! The roar of laughter that rose to heaven was a thing to hear for months afterwards, and, as the seven Malays sheepishly climbed from their perch, they had to endure a regular battery of jokes and fun.

We spent that night on a bank of the river, and next day we came to a spot, which we called Chabang Dua, where two streams of equal size join to form Sungai Sekin. We camped a short distance up the left stream, near a small waterfall, and Penghulu, Mayah, and I went south for two hours, climbing up the ridge between the two streams far enough to be fairly convinced that we were on the right way to Gunong Ulu Kemapan. I told the coolies when we got back to camp, that next morning after their meal they must cook enough rice for a further two meals, as there was a fear that we might not find a stream up on the mountain. We would use the tents to catch rain-water if it rained at night, and if it didn't we should be in a fix. We had no buckets, only

four cooking pots, and there were no bamboos anywhere near to use as receptacles, so we could not carry water up with us.

On August 1st, we set off up the ridge, and made quite good progress. We were glad to find that *daun payong* (*Teysmannia* palms), and *pokok sabun* were abundant, so there would be no trouble in making "tanks" to catch rain-water. We could use their very large leaves for the purpose. After three hours we reached the top of the ridge and Penghulu climbed a tree to try to find the direction of the solitary tree that we knew marked the summit of Gunong Ulu Kemapan. He said it lay south-south-east from us. This was rather surprising, for, on referring to the map, it was clear that the mountain should lie south-west. So I asked him to look about him to see if there was hilly ground in the south-west direction which might possibly be hiding Gunong Ulu Kemapan from his view. No; he was fairly sure that our goal was south-south-east. We continued in that direction, and Pengulu climbed 200 foot trees twice again to find our way. We were all getting tired, and we were very thankful when at about three o'clock we came to a tiny stream, which solved the water difficulty.

We were to camp here for two nights, so I ordered some of the coolies to have a big washing day in the morning while the rest of us went up the mountain. They cleared some of the jungle so as to allow the sun's rays to get at the wet things, and if we hadn't had rain from noon onwards all would have been well. As it was, there was little relief during this trip from the usual festoon of wet trousers and shirts hanging around my bed every night under the tent. There is a widespread impression that men whose work often takes them into the jungle are to be pitied as having to endure so much heat. On the contrary, they usually grumble a good deal about the damp cold, and one of the great bothers is the difficulty in getting washed clothes dry again.

We found that we were very near the top of the mountain, and I was not altogether surprised to find, after taking a few bearings, that I was not on Gunong Ulu Kemapan at all, but that I was at the top of Gunong Ulu Telang, and that the stream at our camp was Sungai Jiwang. Gunong Ulu Kemapan lay some four miles away. It would have taken at least two days to get there, and for the purpose of the geological survey, the view from one mountain was just as useful as the other, so I did not mind that we had gone somewhat astray. This incident illustrates the difficulty of travelling in jungle where there are no known tracks. One has to follow elephant trails, choosing whichever are likely to take one in the right direction, and it is very easy to go wrong. In future, Penghulu and his fellow Jakuns would have no difficulty in finding their way to either mountain. There was a splendid view, in spite of the heavy clouds. One of the most striking features is the wide U-shaped valley of Sungai Jamai, an eastwards-flowing tributary of Sungai Endau, which is prolonged

westwards as the valley of Sungai Chapau, one of the streams which flow to the west to form Sungai Rompin.

Next day, August 3rd, we came down the mountain, and reached the boats at Sungai Sekin in six hours. Going uphill we had taken three days. It rained hard all the afternoon, and the river rose a foot in two hours. The higher water made our downstream journey easier on the morrow, but it was unfortunate in one way, for we had no chance to spear fish as the water was now too clouded for us to see them. I climbed Bukit Embaju, and a few smaller hills, on the way towards Sungai Rompin, and so attained what I consider to be the ideal conditions for a jungle trip, which may be summarised as follows. The whole period of daylight should be occupied, so that one does not feel the need of company; yet ten or twelve hours of boat travelling become very wearisome, while the same time spent in walking is far too exhausting to be good for one's health. The ideal is a mixture of the two, river travelling and walking, and if one is able to camp on a sand-bank near a fairly wide river, where one may get the excitement of shooting *pergam, berkok* (a large green pigeon, coloured like *punai* but as large as the imperial pigeon), or *punai*, followed later, just before the darkness comes, by a bathe, there is usually no difficulty about filling in the hours of darkness with ten hours of sleep. We had a perfect day like this on August 5th, and when I went to sleep on the sand-bank in Sungai Rompin, a mile above Tilan, under a beautiful full moon, I felt that the "ups" of a jungle trip fully compensated me for the "downs."

It was just as well that we had had some good days, because my next excursion, to Bukit Gayong, was quite a trying affair. Batin Gayong, the headman of the Jakuns here, was my guide, and it suited him to pass his house on the way. Instead of taking the known route from Tilan, a short distance downstream, we cut across from where we were, for much of the time following an old abandoned *palong* built years ago by Chinese wood-cutters. Going through the *belukar* and swamp was far worse than jungle, and it was very tiring stepping from log to log of the *palong*. After four or five hours of it we began to feel dissatisfied with Batin Gayong, and a rainy afternoon made us all bad tempered. However, all things come to an end, and we reached the trigonometrical point on Bukit Gayong on the morning of August 7th. We disturbed hundreds of *keluang*, (flying-foxes,) in a tall tree, and it was weird in the extreme to see the multitude of them flying low, with their transparent wings showing honey brown against the strong sun light. It was interesting too to learn from the Jakuns that certain pits five foot square, that we passed on the lower slopes of Bukit Gayong, had been sunk some twenty five years ago by a European prospector, and that they were not traps for elephants, as I first thought, but *lombong* (mine holes). All the

rock exposures on the hills near here showed quartz-porphyry, and it is not likely that there are any payable tin deposits in the neighbourhood. Probably the prospector was looking for gold. There is a good view from the top of the hill, and we could see Gunong Ulu Telang in the clouds peeping up behind the Bukit Mirsemah Bukit Panjang ridge. The country near Bukit Gayong and for some distance to the north is low lying, with occasional hills rising from a swampy plain.

On returning to Sungai Rompin I paid off the ten Jakuns and set off downstream with the Malays, taking with me as souvenirs a few *semambu* (Malacca canes), and a pair of *burong serindit* (love birds) that I had got from the Jakuns. Ah San and one or two of the Malays sold a few coats and pairs of trousers, and we parted the best of friends. We arrived at Kuala Rompin on August 11th, and left the next night in a *bedak* (a kind of boat), en route for Mersing. As was to be expected with a south wind prevailing, and only short periods of favouring breezes, we were at anchor for most of the following two days, and found the small boat very cramped quarters. Our arrival at Mersing on the evening of the 14th was a relief for us all, particularly so for Ah San and Mayah, who are bad sailors. Both of them had bad septic sores on their feet, from leech-bites, and it was quite time for them to have some medical attention.

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## Mandi Ayer Gawar

*By* Dato Sedia Raja Abdullah.

"Mandi Ayer Gawar" (A lustration to bar epidemics) is a kind of medical bathing practised by Malays, with the object of repulsing the advance of an epidemic, such as plague, small-pox or rinderpest. The local medicine-man is invariably warned, well in advance, of the actual nature of the approaching epidemic by the appearance in a dream of a reigning raja or a ruling chief—the colour of the royal robe, be it yellow, white, red or black, having a definite relation to the nature of the coming illness.

The ceremony usually takes place at night. Before the *Dukun* (native doctor) there are placed on a large tray the materials of the ceremony, consisting of some yards of cloth, having the colour of the royal dress seen in the dream: there are also some few yards of white, yellow and black cloth. A large piece of thin, flexible lead is then torn into small pieces and on each piece is written in large characters the letters ا٠ل٠م٠ which when joined together form the Arabic word علم meaning "world." But how the word علم can possibly be so spelt ا٠ل٠م٠ and what rela-

tion it has to the prevention of the epidemic, is a mystery which is inexplicable even to the authority on the subject himself. It is sufficient that the letters are regarded as a supremely effective charm against the attack of that particular form of epidemic! On the tray are also heaped *Rotan Tikus* (a species of rattan) and *Pĕriok Kĕra* (*Nepenthes* sp. a pitcher plant) if the approaching epidemic is plague or small-pox, with the addition of *Buloh Gading* (*Bambusa vulgaris* a species of bamboo) and *Kayu Alai* (*Parkia sumatrana*) in the case of rinderpest. Incense and toasted rice, of course, form an important part of the materials. The tray together with the materials are fumigated three times with incense.

Earthern jars (*Rĕbok*), containing cold water and in number according to the houses in the *kampong* (village), having been placed in front of the medicine-man by the villagers, the *Dukun* chooses a jar which is, in his judgment, the best; and the one so selected is known as the *Rĕbok Tua* (the leading jar). Into it have already been dropped three pieces of *Wang*, which are small copper coins, preferably of high antiquity, or just the ordinary modern 5 or 10 cent silver pieces, should the former be unobtainable; each of the remaining jars receives only one coin. A lighted candle, made by hand from bees-wax, is stuck against the top of each jar, in the water of which are also placed *Bunga Raya* (*Hibiscus* sp.), *Bunga Mĕlur* (Jasmine), *Bunga Kayu Akar Daun Kĕdudok* (*Melastoma polyanthum*), *Daun Kalimunting* and toasted rice.

When everything necessary is ready, the *Dukun* calls upon the Prophet to co-operate with him in warding off the approaching epidemic, recites his magical incantations over the materials and concludes by offering prayers in Arabic. The materials are then left where they are for the night, so as to give the saints invoked sufficient time to sing their own incantations over them.

Early the next morning, when the villagers have assembled at the medicine-man's house, the cold water in the jar is poured in moderate quantities over their heads; the face, hands and feet are also washed. The *Dukun* distributes among the waiting folk the *Bĕnang Sĕmpurna* (Thread of completion) and the flexible lead bound in small strips of black cloth, both of which are to be tied round the arm. This *Bĕnang Sĕmpurna* is made by twining together the threads of those pieces of cloth previously placed on the tray and it is usually of three colours: black, white and red. Each villager is supplied with a small quantity of toasted rice to be eaten, as it has a great medicinal virtue. Besides, he is also given the *Rotan Tikus* and *Pĕriok Kĕra* in the case of plague or small-pox, together with the *Buloh Gading* and *Kayu Alai* in the case of rinderpest, and small strips of the black, yellow and white cloth, all of which are to be placed on the gate of his *Kampong* fence, on the steps and on the door of his house. All these various symbols have a significant meaning.

The *Bĕnang Sĕmpurna,* the flexible lead tied round the arm and the symbols placed on the door, the steps and the gate are visible signs exhibited for the information of the spirit king of the epidemic that the persons using them are all his subjects who must not in any way be attacked.

After the distribution of those various symbols each villager has to pay a customary fee of 5 or 10 cents according to the seriousness of the nature of the epidemic. If it is rinderpest, which might cause a heavy material loss to the villagers, each cattle owner usually has to pay 25 cents irrespective of the number of cattle in his possession.

If the epidemic does not spread to the place where this ceremony of "Mandi Ayer Gawar" has been observed: or if it does, in spite of this means of prevention, but results only in a negligible number of deaths, the village folk pay their communal vow at the grave of some renowned saint.

What seems rather remarkable with regard to this particular ceremony and, indeed, to all other allied forms of ceremonies in connection with Malay magic, is the fact that even the professional *Pawang* himself is not in a position to explain intelligently the various mysteries. Practically everything is done and accepted blindly without any reason being assigned to it. This is what renders research into these matters so difficult to carry out.

NOTE.

The Leading Saints in Rembau. Errata. Vol. III, part III, p. 102. Lines 12 and 13 should read:—settlement of Tanjong Kling, in accordance with the recognised custom (*mĕnĕtau*). To' Manggam married, etc.

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## Spolia Mentawiensia

### Dragonflies (Odonata)

*By* F. F. LAIDLAW, *M.A.*

(TEXT-FIGURES 1—3.)

*With an introduction by C. Boden Kloss.*

i. Introduction.
ii. Systematic.
iii. Remarks on the Dragonfly fauna of the islands.
iv. Notes on the Collection.
v. References to Literature.

### i. Introduction.

The Mentawi Group, to the west of Sumatra, consists of the islands of Siberut, Sipora, and North and South Pagi. The first and northernmost is larger than the other three (which are fairly equal in size) put together.

Except for the Rhopalocera of Sipora scarcely anything was known of their entomology until I visited Siberut and Sipora during September—November 1924, accompanied by Mr. N. Smedley, Assistant Curator of the Raffles Museum, Singapore, and Dr. H. H. Karny, Assistant Entomologist, Zoological Museum, Buitenzorg, Java, with a party of native collectors. I have, as usual, to thank the Government of Netherlands India for the assistance and facilities afforded.

The islands are not very pleasant collecting grounds: they are mostly swamp out of which rise hills nowhere more than 1500 feet high and generally difficult to get at, being surrounded by soft ground. The sago palm is common. The native villages are situated on the banks of rivers some distance upstream, and there are scarcely any paths except those made by the Dutch military posts: these are generally through flat land and are often untraversable owing to floods. There is much rain throughout the year. The islands are unhealthy: in spite of systematic employment of quinine and other precautions, all the members of a party of fifteen, except myself, suffered from malaria either on the islands or soon after leaving them.

The group lies parallel to the west coast of Sumatra and about 60—80 miles distant. Siberut is about seventy miles long and about thirty broad, and its northern extremity is on Lat. 1° South.

The islands are apparently connected with each other by a sea-bottom of less than 100 fathoms, and most bathygraphical charts show a connection with Sumatra, via the Batu Islands to the north-east, by a narrow ridge of similar soundings; but I am inclined to doubt that this ridge is unbroken as indicated, for the faunas of the groups differ greatly, while, though the Mentawi Islands possess a much richer mammalian fauna than the undoubtedly deep-water islands of Simalur and Engano at the extremities of the West Sumatran chain of islands, the fauna is much more peculiar and differentiated than that of Nias Island, also represented as being within the one hundred fathom line. Whatever the depths may be, they certainly are not those of the shallow Sunda shelf (less than 40 fathoms) on which stand almost all the land-masses of Malaysia, i.e., the Peninsula, Sumatra, Java, Bali, Borneo, etc.

Apart from the connecting ridge the group is surrounded by depths of 100—500 fathoms of water; further, everywhere directly between it and Sumatra lies the long Mentawi Basin with depths of 500—1000 fathoms. Such conditions render several of the West Sumatran Islands, in spite of small size and lack of height, zoologically quite as distinct from each other and from the rest of Malaysia as the larger areas of that sub-region are from each other.

The islands are forested all over save for the native's plantations, and our material was obtained from varied localities near the Government stations of Siberut, in the island of that name, and Sioban in Sipora; it came from the sea-shore, low-lying ground, the swamps, cultivated areas, and from such hills as were accessible.

During the journey to and from the islands we also made small collections of insects at Padang, West Sumatra, on Pulau Tello, one of the shallow-water Batu Group to the north of Siberut, and on the Pagi Islands where Dr. Karny spent several days.

As reports on the various collections obtained are prepared they will be published in various journals under the general title "Spolia Mentawiensia."

The following have appeared to date:—

Spolia Mentawiensia: Flora. H. N. Ridley, Kew Bulletin of Miscellaneous Information, No. 2, 1926, pp. 56—94. (vide p. antea).

Spolia Mentawiensia: Birds. F. N. Chasen and C. Boden Kloss, Ibis, April 1926, pp. 269—305. Plate III and fig. 10. (vide p. postea).

Spolia Mentawiensia: Reptiles and Amphibians. Malcolm A. Smith, Ann. and Mag. Nat. Hist. (9) 18, 1926, pp. 76-81.

### ii. Systematic.

*Drepanosticta krugeri* sp. nov.
*Caconeura verticalis karnyi* subsp. nov.
*Amphicnemis louisae smedleyi* subsp. nov.

### iii. Remarks on the Dragonfly Fauna of the Islands.

Up to the present time but a single species of dragonfly had been recorded from any of the islands of the Mentawi group.

This was a species of *Pseudophaea, P. modigliani,* described by de Selys (Selys, 1898) from "Mentawi."[1]

In 1915 Dr. Ris published a most interesting account of a collection of dragonflies made by E. Jacobson in Simalur Island, the most northerly island of the West Sumatran chain (Ris, 1915).

He listed 35 species, the result of seven months collecting. Of these one species and two subspecies were described as new.

The present collection contains almost the same number of species, 34 in all, and amongst these I find it necessary to name one new species and two new subspecies.

The material before me is in excellent condition, with good series of several interesting species, and has full data.

1. Practically certain to have come from Sipora if collected by Modigliani. C. B. K.

In the list following I have entered all the species recorded by Ris from Simalur Island as well as those collected in 1924 on the Mentawi, Group and also the single species recorded by de Selys from "Mentawi."

Those not included in the collection of 1924 are marked with an asterisk (*); those not recorded by Ris thus(†).

Malaysia includes the Malay Peninsula south of the Isthmus of Kra, all the islands of the Sunda Shelf within the 100 fathom line, the deep-water islands off the West Coast of Sumatra, and Cocos-Keeling and Christmas Islands.

## ANISOPTERA.

### Libellulidae.

#### Corduliinae.

1. †*Idionyx montana* Karsch. Malaysia.

#### Libellulinae.

2. †*Tetrathemis platyptera* Selys. .. Bengal to Java.
3. *Orchithemis pulcherrima* Brauer. .. Malaysia.
4. *Pornothemis serrata* Kruger. Malaysia.
5. †*Lyriothemis trappendiculata* Selys. .. Malaysia.
6. †*L. cleis* Brauer. .. Malaysia, Philippine Is., Burma.
7. †*Nesoxenia lineata* Brauer. Malaysia, Philippine Is., Celebes.
8. *Agrionoptera insignis chalcochiton* Ris. .. subsp. Simalur and Mentawi Ids., sp. Malaysia to Solomon Ids.
9. *Cratilla metallica* Brauer. Malaysia, Cambodia.
10. *Orthetrum sabina* Drury. Oriental Region, Pacific.
11. *O. testaceum* Burm. .. Assam to Java.
12. *O. chrysis* Burm. .. Philippine Is., Celebes, Malaysia.
13. **O. pruinosum clelia* Selys. subsp. Philippine, Celebes, Malaysia.
14. *Nannophya pygmaea* Ramb. .. Burma, Malaysia.
15. *Brachydiplax chalybea simalura* Ris. .. subsp. Simalur and Mentawi Ids., sp. Burma, Malaysia.
16. *Diplacodes trivialis* Ramb. Oriental Region.
17. †*Acisoma panorpoides* Ramb. India to Malaysia.

18. **Neurothemis palliata* Ramb. Sumatra to Aru Islands.
19. **N. fluctuans* Fabr. .. Malaysia.
20. †*N. terminata* Ris. .. Malaysia.
21. **Zyxomma obtusum* Alb. Oriental Region.
22. **Tholymis tillarga* Fabr. Old world tropics.
23. *Pantala flavescens* Fabr. Cosmopolitan.
24. †*Rhyothemis phyllis phyllis* Sulz. .. Burma, Malaysia.
25. **R. regia regia* Brauer. .. Moluccas, Philippine Is.
26. †*R. obsolescens* Kirby. .. Malaysia.
27. **Tramen limbata* Desj. .. Oriental Region, Pacific.

**Aeschnidae.**

28. **Anaciaeschna jaspidea* Burm. .. Bengal to Java.
29. †*Jagoria modigliani* Selys. Malaysia.
30. **Gynacantha basiguttata* Selys. .. Malaysia, Philippine Is., Burma.
31. *G. dohrni* Kruger. .. Malaysia.

**Gomphidae.**

32. †*Leptogomphus lansbergi* Selys. .. Java, Sumatra.

**ZYGOPTERA.**

**Libellagidae.**

33. †*Micromerus sumatranus* Selys. .. Sumatra.

**Epallagidae.**

34.*†*Pseudophaea modigliani* Selys. .. Mentawi Islands.
35. **P. aspasia* Selys. .. Sumatra.

**Agrionidae.**

36. **Neurobasis chinensis* Linn. India to Borneo and Java.
37. †*Vestalis lugens* Selys. .. Sumatra.

**Platystictidae.**

38. †*Drepanosticta krugeri* sp. nov. .. Mentawi Is.

**Platycnemidae.**

39. **Copera acutimago* Kruger. Malaysia.
40. *C. marginipes* Ramb. .. India, Ceylon, Malaysia.

**Protoneuridae.**

41. **Caconeura delia* Karsch. .. Sumatra.
42. *C. collaris dohrni* Kruger. Sumatra.

43. †*C. verticalis karnyi* subsp. nov. .. Mentawi Ids., sp. Malaysia.

**Coenagrionidae.**

44. *Pseudagrion pilidorsum* Brauer. .. Sumatra.
45. **P. microcephalum* Ramb. India to Australia.
46. *Ceriagrion cerinorubellum* Brauer. .. India to Malaysia.
47. †*Onychargia atrocyana* Selys. Oriental Region.
48. **Xiphiagrion cyanomelas* Selys. .. Simalur Id. to Bismarck Arch.
49. *Amphicnemis louisae smedleyi* subsp. nov. .. Mentawi Ids., sp. Borneo.
50. **Ischnura senegalensis* Ramb. .. Old world tropics.
51. *Agriocnemis femina* Brauer. Oriental Region to Australia.
52. **A. amoena* Ris. .. Simalur Id.

Of course the list is still incomplete; it is quite likely that it includes less than 80 per cent of the total dragonfly fauna. But the absence of any specimen of *Trithemis* from two fairly large collections is noteworthy. Two other general *Rhinocypha* and *Coeliccia* are unrepresented. The latter is certainly more likely to escape the net of the collector than is *Trithemis* or *Rhinocypha* but it is significant that the two genera *Rhinocypha* and *Coeliccia* are both absent from Ceylon.

So that the first point to be noted about the fauna of these islands is the (apparent) absence of certain widely distributed Oriental genera. If this absence be verified it will show that these genera are late arrivals in Malaysia.

A second point of interest is that certain subspecies are peculiar to Simalur, Siberut and Sipora, and presumably to other islands, and that on the mainland of Sumatra these subspecies are represented by distinct races (e.g. *Agrionoptera chalcochiton*).

Now Simalur and Siberut are much further away from one another than is either from the mainland of Sumatra; but probably have this in common, that both are separated from it (and each other) by deep water. Hence it is fair to assume that we have to deal with a fauna characteristic of certain of the West Sumatran Islands, contrasted with, though closely related to that of Sumatra.

The relative abundance in the collection of certain species usually accounted rare (e.g. *Jagoria modigliani*) may perhaps allow us to suppose that we have to deal with a fauna in which isolation has affected the competition between species in a manner favourable to certain forms usually regarded as primitive. Ris (1915) has called attention to another interesting feature of this

fauna, the inclusion in it of a few species of a decidedly eastern, or even Papuan range, which are scarcely if at all represented elsewhere to Malaysia. Such are *Xiphiagrion cyanomelas* and *Rhyothemis regia*. The significance of these 'outliers' is not at present apparent.

### iv. Notes on the Collection.

[(The initials given with localities in the list of specimens in each case refer to the collectors: C. B. K(loss), N. S(medley) and H. H. K(arny.)]

## ANISOPTERA.

### Libellulidae.

### Corduliinae.

1. **Idionyx montana** Karsch.

*Idionyx montana*. Martin, Monogr. Cordul. p. 81, figs. 94, 95.

1 ♂ Siberut, C. B. K. and N. S. Oct. 1924.
1 ♂ Siberut, H. H. K. 23. IX. 24.
2 ♀ ♀ Sipora, C. B. K. and N. S. Oct. Nov. 1924.
♂ abd. 27-29 + 3 mm. hind-wing 28.5 mm.
♀ abd. 29 mm. hind-wing 29.5 mm.

The anal appendages of the males agree exactly with those figured by Martin (loc. cit).

The males are very similar in size and colouring to a ♂ of *dohrni* Krüger, from Borneo, differing chiefly in the shape of the upper anal appendages. On the other hand a ♂ from Gunong Kledang in Perak, which agrees with specimens of *montana* in the shape of the anal appendages, is much smaller (♂ abd. 25.5 + 3 mm. hind-wing 25 mm.).

The two species *montana* and *dohrni* are evidently very closely related.

### Libellulinae.

2. **Tetrathemis platyptera** Selys.

*Tetrathemis platyptera*, Ris. Monogr. Libell. pp. 50-51, figs. 10-14.

2 ♀ ♀ Siberut. C. B. K. and N. S. Sept. 1924.

One specimen has the hind-wing 20 mm. long: bases of both wings tinged with saffron; in the fore-wing as far as the triangle, in the hind-wing one or two cells beyond the triangle. The rest of the wings slightly smoky.

The second specimen has the hind-wing 18.5 mm. long. Both wings slightly tinged with brown, in the fore-wing to one cell beyond the nodus, the hind-wing to half-way between nodus and pterostigma. In both wings this tinge deepens to saffron at the base; in the fore-wing to the level of the arculus, in the hind-wing to the proximal margin of the triangle. In the fore-wing there is also a saffron suffusion just below the nodus, and in the hind-

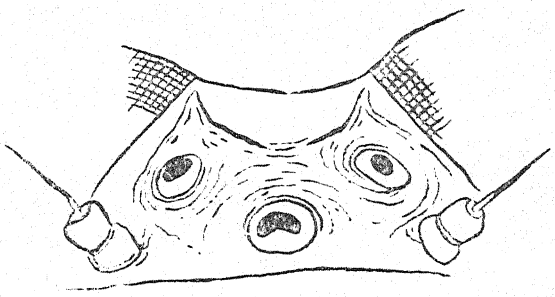


Fig. 1.
Vertex of head of ♀ Leptogomphus.

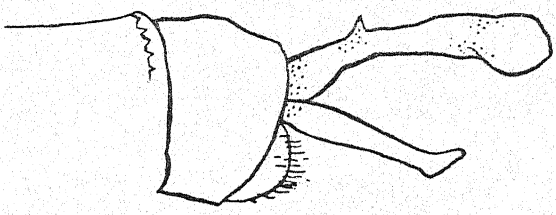


Fig. 3.
Amphicnemis louisae ♂

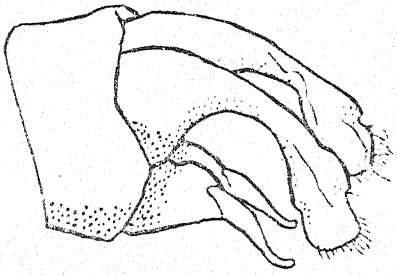


Fig. 2 *a*.
Drepanosticta krugeri ♂

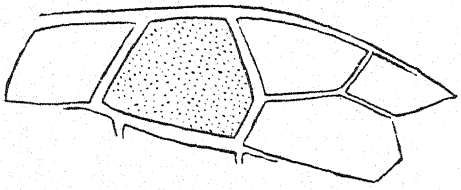


Fig. 2 *b*.
D. krugeri, Pterostigma.

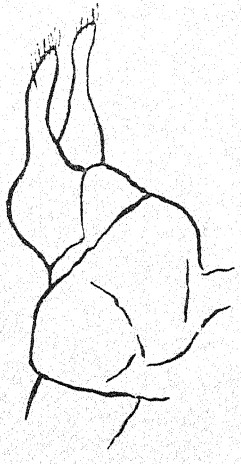


Fig. 2 *c*.
D. krugeri, Prothorax ♂

wing there is a similar suffusion from just beyond the nodus to a point half-way between nodus and pterostigma. In neither wing does the suffusion reach the anal margin. Apex of both wings faintly tinged with smoky brown.

The colour differences of the wings of the two specimens are quite marked, but I can find no structural distinctions.

3. **Orchithemis pulcherrima** Brauer.

*Orchithemis pulcherrima* Ris, Monogr. Libell. pp. 85-86, figs. 54, 55.

2 ♀ ♀ Siberut. C. B. K. and N. S. Sept. 1924.
1 ♀ Siberut. H. H. K. Sept. 1924 (60).

4. **Pornothemis serrata** Kruger.

*Pornothemis serrata* Ris, Monogr. Libell. pp. 92-93, fig. 64.

18 ♂ ♂ 11 ♀ ♀ Siberut. C. B. K. and N. S. Sept. Oct. 1924.
4 ♂ ♂ 4 ♀ ♀ Siberut. H. H. K. Sept. 1924.
3 ♂ ♂ 1 ♀ Sipora. C. B. K. and N. S. Oct. 1924.
2 ♀ ♀ South Pagi. H. H. K. 17. X. 24.

5. **Lyriothemis biappendiculata** (Selys).

*Lyriothemis biappendiculata* Ris, Monogr. Libell. pp. 106-107, figs. 71, 76, 77.

2 ♀ ♀ Siberut. C. B. K. and N. S. 26-28. IX. 24.
3 ♂ ♂ Siberut. H. H. K. 9. IX. 24.

6. **Lyriothemis cleis** Brauer.

*Lyriothemis cleis* Ris, Monogr. Libell. pp. 108-111. figs. 78, 79, 80.

1 ♂ 1 ♀ Siberut. C. B. K. and N. S. Sept. 1924.

7. **Nesoxenia lineata** (Selys).

*Nesoxenia lineata* Ris, Monogr. Libell. pp. 126-128, figs. 93, 94.

3 ♂ ♂ Siberut. C. B. K. and N. S. 24-25. IX. 24.
1 ♀ Siberut. H. H. K. Sept. 1924.
3 ♂ ♂ 3 ♀ ♀ Sipora. C. B. K. and N. S. Oct. Nov. 1924.
1 ♂ Sipora H. H. K. Nov. 1924.

The specimens agree exactly with a (fragmentary) male in my possession from Borneo, and with Dr. Ris' description

8. **Agrionoptera insignis chalcochiton** Ris.

*Agrionoptera insignis chalcochiton* Ris. Monogr. Libell. p. 1068.

5 ♂ ♂ 3 ♀ ♀ Siberut. C. B. K. and N. S. Sept. 1924.
2 ♂ ♂ Siberut. H. H. K. Sept. 1924.
5 ♂ ♂ 2 ♀ ♀ Sipora. C. B. K. and N. S. Sept. Oct. 1924.

The rich but uniform colouring of the synthorax of these specimens contrasts markedly with the variegated pattern of a specimen from Padang in W. Sumatra, which clearly belongs to the typical race. The Padang specimen was collected in Nov. 1924, by C. B. K. and N. S.

9. **Cratilla metallica** (Brauer).

*Cratilla metallica* Ris, Monogr. Libell. pp. 151-153. figs. 108-109.

1 ♂ Siberut. H. H. K. 26. IX. 24.

10. **Orthetrum sabina** (Drury).

*Orthetrum sabina* Ris, Monogr. Libell. pp. 223-225. figs. 133, 149.

1 ♂ North Pagi. H. H. K. Oct. 1924.

11. **Orthetrum testaceum** (Burm.).

*Orthetrum testaceum testaceum* Ris, Monogr. pp. 235-236.

2 ♂♂ Siberut. C. B. K. and N. S. Sept. 1924.
1 ♀ Siberut. H. H. K. Sept. 1924.

12. **Orthetrum chrysis** (Selys).

*Orthetrum chrysis* Ris, Monogr. Libell. p. 237.

6 ♂♂ Siberut. H. H. K. Sept. 1924.
6 ♂♂ 1 ♀ Sipora. C. B. K. and N. S. Nov. 1924.
3 ♂♂ North Pagi. C. B. K. and N. S. Nov. 1924.

13. **Nannophya pygmaea** Ramb.

*Nannophya pygmaea* Ris, Monogr. Libell. pp. 347, 348. figs. figs. 196, 197.

12. ♂♂ 6 ♀♀ Siberut. C. B. K. and N. S. Sept. 1924.
24 ♂♂ 9 ♀♀ Siberut, H. H. K. Sept. 1924.

14. **Brachydiplax chalybea simalura** Ris.

*Brachydiplax chalybea simalura* Ris, Monogr. Libell. p. 1123.

4 ♂♂ Siberut. C. B. K. and N. S. 8-29. IX. 24.

Like *Agrionoptera chalcochiton* this subspecies is apparently confined to the West Sumatran chain of islands.

15. **Diplacodes trivialis** (Rambur).

*Diplacodes trivialis* Ris, Monogr. Libell. pp. 468-470. figs. 293, 294.

1 ♂ Siberut. C. B. K. and N. S. Sept. 1924.
1 ♂ Siberut. H. H. K. 28. IX. 24.
2 ♂♂ 1 ♀ Sipora, C. B. K. and N. S. Sept. 1924.
1 ♀ South Pagi. H. H. K. 17. X. 24.

(10 ♂♂ 8 ♀♀ Padang, Sumatra. C. B. K. and N. S. Nov. 1924).

One of the commonest of Oriental dragonflies.

16. **Acisoma panorpoides** Rambur.

*Acisoma panorpoides* Ris, Monogr. Libell. pp. 457-458.

1 ♂ Sipora. C. B. K. and N. S. 11. X. 24.

17. **Neurothemis terminata** Ris. (forma).

*Neurothemis terminata* Ris, Monogr. Libell. pp. 569, 572. figs. 328, 329, 334, 335.

| | | |
|---|---|---|
| 28 ♂♂ 16 ♀♀ | isochrom. | 12 ♀♀ heterochrom. Siberut. C.B.K. & N.S. Sept. Oct. 1924. |
| 2 ♂♂ 1 ♀ | isochrom. | 3 ♀♀ heterochrom. Siberut. H.H.K. Oct. 1924. |
| 12 ♂♂ 4 ♀♀ | isochrom. | 3 ♀♀ heterochrom. Sipora. C.B.K. & N.S. Oct. 1924. |
| 2 ♂♂ 7 ♀♀ | isochrom. | 1 ♀ heterochrom. N. Pagi. C.B.K. & N.S. Oct. 1924. |
| 1 ♂ | isochrom. | 2 ♀♀ heterochrom. South Pagi. H. H. K. Oct. 1924. |

A very interesting series, intermediate in some respects between *fluctuans* and *terminata*. Dr. Ris has examined specimens and has been good enough to give me his opinion on them, which I transcribe "I am inclined to range your series under *terminata*, but they are decidedly intermediate between typical *terminata* and typical *fluctuans*. I have labelled them for my collection as *terminata* vers *fluctuans*. The series of forms *intermedia-fluctuans -terminata-manadensis-stigmatizaris* may be considered as species, but very probably with series from a very large number of localities the limits between them will be found uncertain. Intermediate forms, such as this from Mentawi, can be located in the series without much constraint; in this case between *fluctuans* and *terminata* though nearer the latter. I still consider the disposition adopted in the monograph as practically convenient."

18. **Pantala flavescens** (Fabr.)

*Panatala flavescens* Ris, Monogr. Libell.

1 ♀ Sipora. C. B. K. and N. S. 30.X.24.

19. **Rhyothemis phyllis** (Sulzer).

*Rhyothemis phyllis phyllis* Ris, Monogr. Libell. pp. 939-940. fig. 540. Pl. V.

1 ♂ Siberut, C. B. K. and N. S. Sept. 1924.

1 ♀ Siberut, H. H. K. Sept. 1924.

20. **Rhyothemis obsolescens** Kirby.

*R. obsolescens* Ris, Monogr. Libell. pp. 958-959. Pl. VII. (as R. vidua).

11 ♂♂ 11 ♀♀ Siberut. C. B. K. and N. S. Sept. Oct. 1924.

5 ♂♂ 1 ♀ Siberut. H. H. K. Sept. 1924.

Borneo, Sumatra, Malay Peninsula as far N. as the Mergui Archipelago.

## Aeschnidae.

21. **Jagoria modigliani** Selys.

*Jagoria modigliani* Martin, Monogr. Aeschn. pp. 130-131. fig. 127. Ris, 1911. pp. 240-242.

| | | | |
|---|---|---|---|
| 2 ♀ ♀ | | Siberut. | C. B. K. and N. S. Sept. 1924. |
| 2 ♂ ♂ | (ad.) | Siberut. | H. H. K. 10—28. IX. 24. |
| 1 ♀ | (ad.) | Siberut. | H. H. K. 28. IX. 24. |
| 2 ♀ ♀ | (ten.) | Siberut. | H. H. K. 14—17. IX. 24. |
| 1 ♂ 1 ♀ | | Sipora. | C. B. K. and N. S. Oct. 1924. |
| 1 ♀ | (ad.) | Sipora. | H. H. K. 9. X. 24. |

Several of the females have retained the long spatulate anal appendages which in this sex are so frequently broken off. The considerable number of specimens collected suggests that this insect usually counted quite a rarity, must be fairly abundant at least in certain localities and at certain seasons.

22. **Gynacantha dohrni** Kruger.

*Gynacantha dohrni* Kruger, 1898. Martin, Monogr. Aeschn. pp. 199-200. fig. 204. Ris. 1915. p. 14.

1 ♂ (teneral) Sipora. C. B. K. and N. S. 19. X. 24.

Newly emerged and quite flattened; probably belongs to this species, which has been recorded by Ris from Simalur.

## Gomphidae.

23. **Leptogomphus lansbergi** Selys. Fig. 1.

*Leptogomphus lansbergi* Kirby Cat. Odonat. p. 70.

| | |
|---|---|
| 1 ♂ 1 ♀ | Sipora. C. B. K. and N. S. Oct. 1924. (the male is the allotype). |
| 1 ♀ | Sipora. H. H. K. Nov. 1924. |
| 1 ♀ | Pagi Ids. H. H. K. Oct. 1924. |
| (1 ♂ | Padang, N. Sumatra. C. B. K. and N. S. Nov. 1924). |

The holotype ♀ is from Java, in Coll. Selys, a second (imperfect) in the Museum at Dresden.

♂ Hitherto undescribed. abd. 39 + 1 mm. hind-wing 31. 5 mm.

♀ abd. 37.5 mm. hind-wing 34 mm.

♀ (adult) *Head*: black; lateral lobes of lower lip, two spots on upper lip, base of mandibles, and a narrow line across the frons interrupted at its middle, immediately in front of the antennae, lemon-yellow.

*Prothorax*: black; a yellow mark on anterior margin, a small double medium spot and a lateral mark, yellow.

*Synthorax*: black anteriorly to just beyond the humeral suture. Paired, narrow dorsal and antehumeral stripes of yellow, the former just meeting a yellow mark on the transverse crest of

the mesothoracic margin, these latter not meeting each other in the middle line. Sides of synthorax largely yellow, with black stripes along each of the lateral sutures.

*Abdomen*: largely black; the first segment almost entirely yellow. The second segment has a lateral band of yellow passing over the vestigial auricles; also a longitudinal dorsal band of the same colour which narrows posteriorly and is continued as a very fine mid-dorsal line along segments 3 —7. There is in addition a basal lateral mark of yellow on the third segment.

♂ (adult) allotype (from Sipora).

Colouring in general identical with that of the female. The spots of yellow on the upper lip are perhaps a trifle larger, and the markings on the abdomen are obscure, but this is probably the result of post-mortem changes. As in the female the legs appear to be entirely black.

*Anal appendages*: black; upper pair a little shorter than the branches of the lower appendage, shaped rather like the blade of a scalpel, with the ' edge ' rather serrate, and the apex acuminate. Branches of lower appendage slender, parallel, widely distant. On the whole the anal appendages bear a general resemblance to those of *L. sauteri* Ris, and *L. perforatus* Ris (Ris 1912). The genital hamules are very large, and the vesicle of the penis is relatively small.

The armature of the femora is quite different in the two sexes, in the females it consists of long spines regularly arranged, in the males of numerous small rather irregular 'prickles.' There are also secondary sexual differences in the armature of the tibiae and tarsi which I do not propose to deal with here.

One further point may be noted. In his original description of the type female de Selys remarks on the presence of two small tubercles on the margin of the occiput. These are scarcely evident on any of the specimens before me, though the margin of the occiput certainly shows some corrugation, which varies from one individual to another. In one female this corrugation is perhaps sufficient to permit of our believing it to represent the "petits tubercles rapproches" of de Selys.

A matter of greater interest perhaps is the occurrence of a ridge on either side of the vertex, immediately behind each of the posterior ocelli. In the female this ridge is produced at its outer extremity to form a distinct horn-like projection recalling exactly the armature figured by Calvert (1920) for some of the females of species of the Tropical American genus *Epigomphus*, and more especially that of *E. armatus*. In a faunistic paper such as this one cannot discuss at length morphological and taxonomic questions. It is necessary only to say that the examination of these specimens convinces me that *Leptogomphus* is a genus very distinct

from *Heliogomphus*, and that it (*Leptogomphus*) resembles in venation and in some other morphological characters the American *Epigomphus*, and is probably not distantly allied to it.

Kruger (1898 pp. 307-308) proposed to distinguish Sumatran specimens apparently very similar to *lansbergi* under the name *assimilis*. Not having access to his material I cannot judge to what extent he is justified in so doing. I can only say that the specimens before me are to the best of my belief identical with that described from Java by de Selys.

Species undoubtedly referable to *Leptogomphus* are
*semperi* Selys. Borneo, Philippine Is. Tonkin.
*lansbergi* Selys. Sumatra, Java.

| | | | |
|---|---|---|---|
| *Gestroi* | *gestroi* | Selys | Burma. |
| | *williamsoni* | Laidlaw | Borneo. |
| | *perforatus* | Ris | S. China. |
| *Sauteri* | *sauteri* | Ris | Formosa. |
| | *assimilis* | Kruger | Sumatra. |

## ZYGOPTERA.

### Libellagidae

24. **Micromerus sumatranus** Selys.

*Micromerus sumatranus* Kirby Cat. Odonat. p. 115.

2 ♂♂ Sipora. H. H. K. Oct. 1924.

### Agrionidae

(Legion *Calopteryx de Selys partim*).

25. **Vestalis lugens** (Selys).

*Vestalis lugens* Kirby Cat. Odonat. p. 102.

1 ♂ Siberut. H. H. K. Sept. 1924.
10 ♂♂ 4 ♀♀ Sipora. C. B. K. and N. S. Oct. 1924.
1 ♂ 1 ♀ Sipora. H. H. K. Oct. 1924.

### Platystictidae.

26. **Drepanosticta krugeri** sp. nov. Figs. 2 a. b. c.

1 ♀ Siberut. C. B. K. and N. S. Oct. 1924.
1 ♂ Siberut. H. H. K. Oct. 1924.
4 ♀♀ Sipora. C. B. K. and N. S. Oct. 1924 (one of these is the allotype).
3 ♂♂ Sipora. H. H. K. Oct. 1924. (one of these is the holotype).
1 ♂ N. Pagi Is. C. B. K. and N. S. Oct. 1924.

A distinct species, characterized by the shape of the anal appendages of the male, and by the presence in that sex only of a remarkable paired process derived from the posterior margin of the prothorax. A well defined V-vein present on the wings.

The pentagonal pterostigma is also apparently a specific character.

♂ abd. 39 + 0.75 mm. hind-wing 24 mm.
♀ abd. 35 mm. hind-wing 24 mm.

*Venation*: $M_3$ rises a little distal to subnodus. $M_{1+3}$ and $M_4$ rise from arculus by a short common stalk.

Vein descending from anal side of quadrangle meets cubito-anal cross-vein so as to form a V.

Pterostigma dull red-brown, pentagonal, its outer margin almost always broken by a veinlet dividing the cell distal to it into two. Costal margin shorter than anal, and inner margin shorter than outer. 16 post-nodal cross-nerves on fore-wing.

♂ *Head*: Upper lip blue, with black margin, anteclypeus blue, upper surfaces otherwise black.

Prothorax: white or pale primrose yellow, posterior lobe black. From the outer angle of the posterior margin of this lobe there springs on either side a small club-shaped process, directed almost vertically upwards; pale brown in colour.

*Synthorax*:above bright metallic green as far as level of first lateral suture. Beyond this pale blue, with a broad band of dark brown along and on either side of the second lateral suture. Ventral surfaces white.

*Abdomen*: generally dark brown, rather bronzed. Second segment marked with white at the sides and below. Segments 3—7 with small basal-lateral markings, probably blue in the living state. Basal third (nearly) of eighth segment blue above, a small, basal dorsal mark of the same colour on the ninth.

*Legs*: white, with brown cilia, articulating with brown markings, a broad brown band round the middle of each femur; posterior surfaces of tibiae dark brown.

*Anal appendages*: upper pair bronze-brown, curving regular downwards in a semicircle, a little inflated distally. Viewed from above they curve inwards towards their apices so as to enclose a nearly circular space. Each appendix carries a minute internal projection near its apex. Lower pair, whitish, about half the length of upper pair, parallel to one another, broad at the base, tapering, first rapidly then more gradually to a fine point, bending rather abruptly downwards at the middle.

♀ Colouring as in male, but segment 8 of abdomen has a lateral blue mark, continued on to the base of 9, which is slightly longer than 8.

The relationship of this species seems to be with the *sundana-halterata* group, ranging from Sumatra and Java to New Guinea, rather than will Bornean or Malayan forms.

**Platycnemidae.**

27. **Copera marginipes** (Ramb.)

*Capera marginipes* Kirby Cat. Odonat. p. 129.

1 ♀ Siberut. C. B. K. and N. S. Sept. 1924.
5 ♀♀ Sipora. C. B. K. and N. S. Oct. 1924.

In the absence of male specimens the identification rests on the character of the posterior margin of the prothorax, which in these specimens agrees with examples of the species from Singapore. The species *acutimargo* Kruger, does not occur in the present collection, through recorded by Ris from Simalur; and I have before me specimens of it from Mergui (Bainbrigge-Fletcher) and from the Isthmus of Kra (W. L. Abbott, U. S. Nat. Mus.).

**Protoneuridae.**

28. **Caconeura collaris dohrni** Kruger.

*Alloneura dohrni* Kruger, 1898.

*Disparoneura dohrni* Ris, 1915.

2 ♂♂ Siberut. C. B. K. and N. S. Sept. 1924.
7 ♂♂ 5 ♀♀ Sipora. C. B. K. and N. S. Oct. 1924.
2 ♂♂ 1 ♀ Sipora. H. H. K. 2. XI. 24.

Both Kruger and Ris regarded *dohrni* as a distinct species and do not compare it with *collaris* Selys. I find, however, that the specimens before me agree exactly in colouring with *collaris* (judging from re Selys' account), and differ only in having no trace of $Cu_2$ visible to the naked eye. Under low power of the compound microscope one can see constantly in these specimens a thickening of the anal margin of the wing where it is joined by *Ac.* In *collaris* (from the Malay Peninsula) the development of $Cu_2$ is said by de Selys to be "mediocre on rudimentaire." Accordingly I am strongly of the opinion that these specimens must be reffered to *collaris*, of which they represent a local Sumatran race characterized by extreme reduction of $Cu_2$. I think the character is of sufficient importance to justify the naming of such a local race, but it may be found that the reduction is carried as far in some cases in specimens from the Malay Peninsula (given a sufficient series).

29. **Calconeura verticalis karnyi** subsp. nov.

1 ♂ Siberut. H. H. K.

*Head*: Upper lip, genae and anteclypeus dark brown; a transverse red band, crossing the anterior ocelli, on the vertex. Otherwise black.

*Prothorax*: black; a small lateral spot of carmine red on either side of the middle lobe.

*Synthorax*: black, with a narrow band on either side of the dorsum of carmine red; a broader band of orange-red on the first lateral suture, the metepimirite narrowly bordered behind with yellow. Under surface, primrose.

*Abdomen*: entirely black save for a minute pair of yellow spots at base of third segment dorsally.

*Legs*: black; a brown mark at base of femora on their anterior surfaces; posterior surfaces of tibiae likewise brown.

*Anal appendages*, upper pair black, lower pair brown. Pterostigma very dark brown. Marginal cell, formed by vestige of $Cu_2$ rather larger in fore-wing than in hind-wing. Length of hind-wing 17mm., of abdomen 27 mm. Differs from typical (Bornean) *verticalis* as follows. Carmine mark on prothorax (in *karnyi*) smaller. Dorsal stripe on synthorax much narrower, and of equal breadth throughout. Second segment of abdomen entirely black. Upper anal appendages entirely black, and rather less globose at base. *C. delia* Karsch has the dorsal stripe of the synthorax not extending quite to the middle of the dorsum, and the anal appendages red-brown.

The three forms *verticalis* (typical), *delia* and *karnyi* appear to be very closely related.

## Coenagrionidae.

30. **Pseudagrion pilidorsum** Brauer.

*Pseudagrion pilidorsum* Ris, 1915.

4 ♂ ♂ Sipora. C. B. K. and N. S. Oct. 1924.
1 ♂ Sipora. H. H. K. 22. X. 24.

31. **Ceriagrion cerinorubellum.**

*Ceriagrion cerinorubellum* Kirby Ca. Odonat. p. 154.

2 ♂ ♂ Siberut. H. H. K. Oct. 1924.

These specimens closely resemble two males from Sarawak with which I have compared them.

Specimens from Mysore (India) are distinctly larger, and have the basal half of the third segment red, whereas in the Bornean and Mentawi specimens this segment appears to be entirely very dark green. The Indian specimens also have the lower anal appendages relatively shorter and stouter than they are in any of the specimens from the more Easterly localities.

A ♂ from Ceylon agrees in general with the Indian specimens but is smaller. It is quite likely that a number of recognizable local races exist.

Length of hind-wing Indian 21 mm. Mentawi 17 mm.
„ of abdomen Indian 32 mm. Mentawi 30 mm.

32. **Onychargia atrocyana.**

*Onychargia atrocyana* Kirby Cat. Odonat p. 139.

2 ♂ ♂ Siberut. C. B. K. and N. S. Sept. 1924.

33. **Amphicnemis louisae smedleyi** subsp. nov. Fig. 3.

*Amphicnemis louisae* Laidlaw, 1913: Ris, 1915

11 ♂ ♂ 14 ♀ ♀ Siberut. C. B. K. and N. S. Sept. 1924.
2 ♂ ♂ 2 ♀ ♀ Siberut. H. H. K. Sept. 1924.
2 ♂ ♂ 1 ♀ South Pagi. H. H. K. 17. X. 24.

Closely related to the typical race from Borneo, but differs in that the male has the spine of the posterior margin of the prothorax almost undeveloped, whilst in the female the spine though more in evidence is still not so developed is in the Bornean race. As this character is constant in the Mentawi specimens (and in the single ♀ from Simalur noted by Dr. Ris) we are justified in naming a local race.

The females with their carmine-red thorax and legs must present a striking appearance.

34. **Agriocnemis femina.**

*Agriocnemis femina* Kirby Cat. Odonat. p. 158. Ris, 1916.

1 ♂ Siberut. C. B. K. and N. S. Sept. 1924.
1 ♀ South Pagi. H. H. K. 17. X. 24.

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## Malay Manuscripts

*By* HANS OVERBECK.

When going on leave to Europe early last year, Dr. R. O. Winstedt asked me to try and find out what there was of Malay MSS in the Public Libraries of Germany. The intention was simply to compile a list from their catalogues. Enquiries showed that there were Malay MSS in the Preussische Staatsbibliothek of Berlin, the Sächsische Landesbibliothek of Dresden, the Bayerische Staatsbibliothek of Munich, and the Stadtbibliothek of Hamburg; but those of Berlin, Dresden and Hamburg apparently were not properly catalogued, and Berlin and Dresden offered to place the MSS at my disposal at the Stadtbibliothek of Bremen, where I was

then living, under the exchange-system existing between most of the Public Libraries of Germany. This offer I had to accept though I was by no means prepared for the task, as I had very little time at my disposal and none of the catalogues of the Libraries of Batavia and Leiden for reference. This latter proved rather disastrous, as later comparison with those catalogues showed that I had spent much valuable time on works which were already fully described therein, and omitted to examine more carefully those that were not.

In order to be as brief as possible, reference is made below only to Prof. Dr. van Ronkel's "Catalogus der Maleische Handschriften in het Museum van het Bataviaasch Genootschap van Kunsten en Wetenschappen" (Batavia 1909) abbreviated to "Batavia." In that most valuable catalogue the catalogues of Leiden (Leidsche Universiteits-Bibliotheek, catalogue by Dr. H. H. Juynboll), London (East India House, Royal Asiatic Society, British Museum), Cambridge, the Hague, Brussels and Paris are also referred to, and I was able to restrict myself simply to mentioning the place or places where other MSS of the same work are to be found. I have also made free to borrow from the Batavia Catalogue some references to special articles published on one or the other work. Occasionally reference is made to "Leiden II," which means the "Supplement-Catalogus der Maleische en Minangkabausche Handschriften in de Leidsche Universiteits-Bibliotheek," published by Prof. Dr. van Ronkel in 1921.

As regards the spelling the Straits method is followed. In rendering the beginning of a MSS written in Dutch romanized transcription, I have changed oe into u, tj into ch, dj into j, j into y, etc.: as I have no knowledge of Arabic I am afraid I have made many errors in transcribing Arabic words as far as they are not of daily occurrence in Malay.

I have to thank the Preussische Staatsbibliothek, Berlin, and the Sächsische Landesbibliothek, Dresden, for kindly placing their valuable MSS at my disposal at Bremen, and especially Prof. Dr. Weil, Director of the Orientalische Abteilung of the Pr. St. B. at Berlin, for granting me special facilities without which I would have been unable to finish the work: also the Bayerische Staatsbibliothek Munich, for kindly sending me the abstract of their catalogue, and Dr. W. Aichele of the University of Hamburg, who kindly examined for me the Brockelmann-catalogue of the Stadtbibliothek of Hamburg and wrote me an account of the Malay MS it contained as given below. I am further under great obligation to the Director of the Stadtbibliothek at Bremen, for his kind assistance in obtaining the MSS for me and allowing me every facility.

**Preussische Staatsbibliothek Berlin.**

(Schoemann-Catalogus).

[*Note on the Schoemann-catalogue.*—A number of MSS of this collection are apparently copies of well-known works made to order, probably for a European collector, as they seem to be very little used, and to judge from the handwriting, are written by a few different scribes. Possibly they are copied from MSS in the Batavian library.

Apparently Prof. Dr. C. Snouck-Hurgronje has examined some of the MSS of the Schoemann-catalogue, and the notes he left in the books were of great assistance to me.]

**Sch. V. 1.** Modern MS, European paper, folio, 119 pp. of 22 lines.

*Chĕritĕra Raja Banjar dan Raja Kota Ringin.*

Without date. Cf. Batavia cccxlvi—cccliii. Other MSS. Leiden, London.

**Sch. V. 2.** Modern MS, Europ. paper, folio, 119 pp. 25 lines.

*Chĕritĕra tĕtĕkala pĕrmulaan orang mĕndapat raja di-nĕgĕri Kutai Kĕrta Nĕgara.*

Written by Khatib Muhamad Tahir at Kutai Kĕrta Nĕgara, Kampong Padidi, finished 30th Rabi-ul awal A. H. 1265, in the year Wau. Cf. Batavia ccclxxviii, styled "Salasilah Kutai."

An account of the Berlin MS has been published by Prof. Dr. Snouck Hurgronje in the "Bijdragen van het Kon. Inst. v.d. T. L. and V. K. v. N. I.", 5, III, 109-120.

**Sch. V. 3.** Modern MS, Europ. paper, folio, 30 pp. of 20-21 lines.

*Chĕritĕra dĕripada satĕngah pandita yang arif budiman akan mĕnchĕritĕrakan dĕripada asal bangsa jin dan sĕgala dewa-dewa.*

Without date. Cf. Batavia cccxc, where it is styled "Hikayat asal bangsa jin dan dewa."

**Sch. V. 4.** Modern MS, white paper, folio, 92 pp. of 24 lines.

*Chĕritĕra Maharaja Rawana.*

A version of the Hikayat Sĕri Rama. A comparison with the two texts published by Roorda van Eysinga and Shellabear was impossible for want of time. The end, in any case, differs from the published texts. When the different countries conquered by Rama are distributed, Anggada feels himself slighted, the soul of Bali takes possession of him, and he fights against Rama and Laksamana, who are unable to conquer him. On Hanuman's advice Bali is recalled to life by Bibisĕnam and invested with his former kingdom of Lĕgur. Bali states that his soul had taken possession of Anggada, because he saw the latter not fairly treated by Rama; he makes his kingdom over to Anggada and disappears.

Without date. The spelling is different from the usual Malay and is similar to that of Měnangkabau.

**Sch. V. 5.** Modern MS, Europ. paper, folio, 175 pp. of 16 lines.

*Theological work* on God and the world, life and death.

Dated A. D. 1847, without Mohamedan year.

Apparently a copy of another MS.

**Sch. V. 6.** Modern MS, Europ. paper (Watermark "Kent 1823") folio, 355 pp. of 23 lines.

*Sirat al-mustakim.*

Written A. H. 1044 to explain the creed of Imam Shafei, translated from the Arabic into Malay (Jawi) by Shaikh Nur Aladin Muhamad Jilan ibn Ali.....of the sect of the Shafeites at Mokallah. With an appendix over Nikah, Wali, etc.

Without date, (the copy) written by Greru (Guru?) Sariman of Ampenan (Lombok), property of Nanang Dunia of *Kĕsumba.*

Cf. Batavia dxlvii—dliv. Other MSS, Leiden.

**Sch. V. 7.** Modern MS, Eur. blue paper, folio, 67 pp. of 21 lines.

*Bahawa ini hikayat bab al-akal*.....hikayat al-ajaib dunia arbah fathal bab yang kĕtujoh pada mĕnyatakan akal dan elmu dan mĕnyatakan elmu firasat.

Divided into four chapters on seven objects:

Ch. 1: On the good and the bad in mankind, on intelligence (akal) and science (elmu).

Ch. 2: On prosopology (elmu firasat) and the science of gestures (elmu kiafat).

Ch. 3: On anatomy (elmu tashrih) and therapeutics (elmu tabib).

Ch. 4: Guide for the marriage (nasihat nikah).

Without date. Cf. below, Sch. V. 36.

**Sch. V. 8.** Modern MS, Europ. paper, bound together 29 pp. folio of 15 and a book of 11 pp. folio of 13 lines.

Title: *Bok Mi punya buku mĕlayu ka-dua.* On one side the Malay text in Arabic characters on the other side romanized in Dutch transcription.

*Fragment of the Hikayat Raga Singasayah.*

Without date. Cf. below, Sch. V. 22.

**Sch. V. 9.** Modern MS, Europ. paper, folio, containing:—

(*a*) 189 pp. of 22 lines.

*Hikayat Indera Putera.*

Finished 29th bulan Haji, A. H. 1262.

Cf. Batavia, lxxxix—xc. Other MSS, Leiden, London. The Hague, Brussels.

(*b*) 91 pp. of 23 lines.

*Hikayat Aranda Kasina*, called at the end *Hikayat Jaya Langkara*. Finished the 13th Zulkaidah A. H. 1262.

There are several other MSS of the Hikayat Jaya Langkara, cf. Batavia clxxiv and Leiden ii, 27-29, but the contents of this MS, seem to correspond to that of Batavia cxiii, called Hikayat Ahmad Muhamad VI, of which perhaps it is a copy.

**Sch. V. 10.** Modern MS, Europ. paper, folio, containing:—

(*a*) 130 pp. of 19 lines.

*Chĕritĕra Maharaja Boma*.....daripada bahasa Jawa di-pindahkan bahasa Mĕlayu.

Cf. Batavia lxxix—lxxxiii. Other MSS Leiden, London.

(*b*) 10 pp. of 19 lines.

*Hikayat Krisna*.....chĕritĕra daripada bahasa Jawa.

Krisna informs Arjuna that the prince of Astina will oppress him. Noman (Hanuman) receives from his mother, Dewi Injani, a standard which gives to Arjuna great supernatural power. (In the Sanscrit-Mahabharata Arjuna carries a monkey-standard). Arjuna knows that Vishnu has become Rama, Rama has become Krishna, and that in Laksamana Batara Basuki in incorporated.

Finished 14th Shaaban A. H. 1252 at Pasar Lama.

**Sch. V. 11.** Modern MS, European paper, quarto, 822 pp. of 13 lines.

*Hikayat Sultan Iskandar Zu'l-karnain.*

Finished 10th May 1851—9th Rĕjab 1267 A. H.

Cf. Batavia cccxxxv—cccxxxvi. Other MSS Leiden, London, The Hague.

**Sch. V. 12.** Modern MS. Europ. paper, quarto, 538 pp. of 13 lines.

*Taj-as-Salatin, Mahkota daripada sĕgala raja.*

Finished 27th July 1848—27th Rĕjab 1274 A. H.

Cf. Batavia cxxxiii—cxxxvi. Other MSS Leiden, London, Brussels.

**Sch. V. 13.** Modern MS, Europ. paper, quarto, 233 pp. of 15 Lines.

*Hikayat Sultan Mahmud Guznawi.*

Ends with a shaër of 28 quatrains. Without date.

**Sch. V. 14.** Modern MS, Europ. paper, quarto, containing:—

(*a*) 150 pp. of 14 lines.

*Hikayat Sultan Mahmud Guznawi.*

Same story as above, but slightly differing in the text.

(*b*) 86 pp. of 14 lines.

*Hikayat unggas bayan dan bujangga arifin.*

Appendix: three pages of shaër.

Finished A. H. 1251.

Probably a version of the Hikayat bayan budiman, Cf. Batavia lxvi—lxx, other MSS Leiden, London, Singapore.

**Sch. V. 15.** Modern MS, Europ. paper, quarto, 205 pp. of 15 lines.

*Hikayat Indĕra Nata.*

Finished in the month of Moharram, without year.

Cf. Batavia lxxxiv—lxxxviii. Other MSS Leiden.

**Sch. V. 16.** Modern MS. Europ. paper, quarto, 287 pp. of 13 lines.

*Hikayat daripada bahasa Arab: Hikayat Raja Ahmad* (?).

Finished 25th Safar A. D. 1845 (without Mohamedan year). Probably the Hikayat Ahmad Muhamad, Cf. Batavia cviii—cxiii. Other MSS Leiden, The Hague.

**Sch. V. 17.** Modern MS, Europ. paper, quarto, 240 pp. (probably not quite complete).

*Hikayat daripada bahasa Jawa,* maka dipindahkan oleh dalang.

Finished in the month Jumadi'lakhir A. H. 1262—1846 A. D.

Seems to be another version of the above Sch. V. 16.

**Sch. V. 18.** Modern MS, Europ. paper, quarto, 143 pp. of 15 lines.

*Hikayat Sĕmaun.*

Without date. Cf. Batavia cccviii—cccix.

**Sch. V. 19.** Modern MS, Europ. paper, quarto, 136 pp. of 12 lines. (incomplete).

*Hikayat Sĕmaun.*

Without date.

**Sch. V. 20.** Modern MS, Europ. paper, quarto, 140 pp. of 14 lines.

*Hikayat Sĕmaun.*

Without date. Vocalized text, with many faults, ends with a shaër of 11 quatrains and a captatio benevolentiae for the shortcomings of the scribe, which is indeed necessary.

(On the "Hikayat Sĕmaun" see the article by Prof. van Ronkel in the Tijdschrift Taal-Land and Volkenkunde van Ned. Indie, xliii, 1901.)

**Sch. V. 21.** Modern MS, Europ. paper, quarto, 154 pp. of 13 lines.

*Hikayat Indĕra Bangsawan.*

Written at Bogor (Buitenzorg), Kampong Bĕbakan Gudang, 17th. Jumadi'lawal (without Moh. year)—13th May 1842.

Cf. Batavia ccviii—ccxiii.

**Sch. V. 22.** Modern MS, Europ. paper, quarto. 78 pp. of 12 lines.

*Hikayat Raga Singasayah.* (cf. above, Sch. V. 8.)

Without date.

There are many lacunae in this MS, and parts of it are misplaced. With the assistance of Sch. V. 8 the contents can be reconstructed as follows: A man called Raga Singasayah going in quest of adventures (mĕmbuang diri-nya), comes after long wanderings to a pleasure-garden, bathes there and falls asleep. The garden is the property of Prabu (king) Suria di Nĕgara of Umbara Madya, and of his brothers, Guriagandah and Suria Chandra. The prince has a daughter, Ratna Jĕmanti, and two sons, Raden Kota and Raden Bĕnua. The king refuses all suitors who ask for the hand of his daughter, even king Markani Kampar of Nusa Bĕntala, whose letter, though threatening war in case of refusal, is torn to pieces, and Markani Kampar prepares for the war. Princess Ratna Jĕmanti hears this and falls ill; the astrologers say that Raden Kota must search for the remedy. He leaves the town accompanied by Raden Bĕnua; they find Raga Singasayah, who pretends to be a dweller of the jungle, and they take him back to their father. Raga Singasayah promises to find the remedy for the princess, after her father has promised him the hand of his daughter.

In Mayan Tipura reigns King Indĕra Loka, whose daughter Ratna Dewi loves to visit her pleasure-garden "Si-pĕnglipur Bĕrangti."

In the demon-country, Durga Gemuling, reigns King Ludara Bĕnchana, who is unmarried. His prime-ministers, Amban Kaniasi and Mantĕri Lĕmbus, in search of a wife for their royal master, carry off Princess Ratna Dewi whilst she is asleep in her pleasure-garden and bring her to Ludara Bĕnchana, who lodges her for the time being in his own pleasure-garden.

King Indĕra Loka calls up his subject-princes and orders the prince of Malaka to search for the lost princess and not to return without her; promising her to the prince who brings her back. They find out that the princess is living on the mountain Giri Jĕmuling, and coming to Durga Gĕmuling the fight begins with the demon-army led by Amban Kaniasi.

Six months later Raga Singasayah comes to the mountain and meets the princess; she takes him for a messenger of her father and asks him to bring her back to him which at first he refuses. (Lacunae in both texts.) When at last he leaves the mountain with her he meets the prince of Malaka who offers him 1000 dinars and more if he will hand over the princess to him. The princess, asked by Raga Singasayah, refuses to be handed over to the prince

of Malaka, and when the latter tries to carry her off by force Raga Singasayah disappears with her and appears again on the *alun-alun* (the place before the palace) of Mayan Tipura. The king, informed of the return to his daughter, has her brought into his palace. Whilst he questions Raga Singasayah as to where he has found her, the prince of Malaka comes with the other princes and claims the princess as a reward for his victory over the demons; Raga Singasayah had carried her off during the night out of his camp. The demon-army arrives, and the king promises his daughter to the prince who conquers the demons. The prince of Malaka and his friends fail, Raga Singasayah is given the horse and the weapons of the king and enters the battlefield; the army of Mayan Tipura flees at the sight of the demons, and Raga Singasayah calls his adopted brother Sokma Jaya, who lives as an ascetic. With the assistance of the animals of the forest he conquers the demons and cuts off their king's head; Amban Kaniasi returns with the remainder of the army and practices asceticism on the top of the mountain of Indĕra Gila in order to obtain supernatural powers for the vengeance she has vowed against Raga Singasayah.

Raga Singasayah takes leave of Sokma Jaya and returns to Mayan Tipura with the head of the demon-king, and the prince of Malaka and his friends leave the court ashamed. Raga Singasayah is married to Princess Ratna Dewi. After six months he reminds her of her promise to give him the remedy for Princess Ratna Jĕmanti. (This promise has probably been given to him as a reward for taking her back to her father, cf. the lacunae mentioned above). She asks her father for the ring " Akip baharu tĕtah pilih," and Raga Singasayah asks for three months leave and returns with the ring to Umbara Madya. He informs the king that he has received the remedy for his daughter from the king of Mayan Tipura, but is mocked by Guriagandah, who demands the ring and in spite of Raga Singasayah's warning, that only he himself may use the ring, places it on the head of his niece, who promptly dies. Guriagandah orders Raga Singasayah to be killed and cut to pieces, the ring is put on his finger, and the pieces are thrown into the sea, but are saved by birds and fishes and brought to the island Pulau Tasik. There lives a pious Shaikh, Timbah Sĕgara, with his daughter Dewi Ratna Sĕmudarah. He finds the hand with the ring, takes the ring off and puts it on the finger of his sleeping daughter, who dreams that she marries Raga Singasayah whom Shaikh Timbah Sĕgara restores to life by his prayers and marries to his daughter. Raga Singasayah sees the ring on the hand of his wife, asks for and obtains it and returns to Umbara Madya. Suria Chandĕra brings him to the king, where his appearance frightens Guriagandah very much and Raga Singasayah offers to restore the princess to life.

Apparently he succeeds in doing so (lacunae in both texts) and the king orders Suria Chandĕra to prepare the marriage of Raga Singasayah and Princess Ratna Jĕmanti. Guriagandah in the meantime invites Raga Singasayah to join him in a hunting trip. Arrived in the forest he warns Raga Singasayah against two dangerous bantengs (wild steers) called Tungkul Ulung and Tandas Bang, and they take shelter on the brink of a deep cavernous pit. Guriagandah pushes Raga Singasayah into the pit, which he has closed like a tomb, and gives money to his followers to make them say that Raga Singasayah had been killed by the bantengs, but they are not at all pleased with that ruse. The king, who fears trouble, sends Suria Chandĕra, accompanied by Raden Kota and Raden Bĕnua, to the forest. They see the hunters returning, hide and hear their conversation, from which they gather that Raga Singasayah has been killed by Guriagandah. Suria Chandĕra forces the men to full admission, comes to blows with Guriagandah, and both return to the king. But nothing is to be done but to prepare against the attack from Nusa Bĕntala.

Three days later Raga Singasayah is found in the pit by a Jin, who is leading the life of an ascetic after being left by her husband. She is called Ibu Pĕrtewi. She remembers the prophecy of her husband, that her daughter shall not marry a Jin, but a man, and who better than Raga Singasayah, the son of Maharaja Suka Pĕnchana. She sends her daughter, Dewi Ratna Pĕlata, to help Raga Singasayah. Daughter proposes to him a riddle (a tree with 4 branches, 2 flowers, 7 leaves and 8 fruits), and when he has solved it to her satisfaction (the world with the 4 cardinal points, sun and moon, the 7 days and the 8 years Alif, Ba, Jim, etc.) she brings him to her mother, and they are married by Jin-Santris. Three months later he asks for leave to go to Umbara Madya, and Dewi Ratna Pĕlata gives him a magic arrow by which means he is able to travel through earth and water. He arrives at Umbara Madya, is greeted with great joy by the king and Suria Chandĕra, and is now to be married in earnest to Princess Ratna Jĕmanti.

Here the story, as far as it can be reconstructed, breaks off. Fragments in 8 and 22 say that Raga Singasayah in his own country loves to enjoy himself with the higher court officials and officers, and slanderers tell his brothers, Raga Sudarmah and Raga Sastra, that Raga Singasayah intends to usurp the throne. They prepare to fight him and an old minister, who sees through the calumniations, warns Raga Singasayah. (This may be a later episode, or the beginning, as the warning of the minister may have caused Raga Singasayah, to "membuang dirinya.")

The story is apparently of Javanese origin.

**Sch. V. 23.** Modern MS, Europ. paper, quarto, 304 pp. of 15 lines.

*Panji Sumirang.*

Written at Bogor (Buitenzorg), 10th March 1846. Cf. below, Sch. V. 26. Cf. Batavia, xxxix—xli. Other MSS, Leiden.

**Sch. V. 24.** Modern MS, Europe. paper, quarto, 120 pp. of 15 lines.

(*a*) 105 pp. *Hikayat Si Miskin.*

Cf. Batavia cxl—cxliv. Other MSS, Leiden, London.

(*b*) 7 pp. *Hikayat Putĕri Salamah.*

The story of Princess Salamah, who comes to Mohamed and talks with him over the duties of the wife towards her husband.

Cf. below, Sch. V. 44, A. Cf. Batavia, cixcii—ccxciv, styled "Hikayat Fartana Islam," of which there are other MSS at Leiden and London.

(*c*) 8 pp. *Hikayat Iblis.*

Cf. below, Sch. V. 44, B. Cf. Batavia cclxxiv—cclxxv. Others MSS, Leiden. Without date.

**Sch. V. 25.** Modern MS, Europ. paper, quarto, 26 pp. of 14 lines.

Bab ini surat pada menyatakan *silsilab asal daripada sĕgala raja-raja Sambas.*

Without date. Cf. Batavia, ccclxiv—ccclxv, styled "Asal raja-raja Sambas."

**Sch. V. 26.** Modern MS, Europ. paper, quarto, 238 pp. of 13 lines.

*Panji Sumirang*, lalakon Raden Galoh Chĕndĕra Kirana Ningĕrating Kuripan.

Finished 21st Rĕjab A. H. 1259. Cf. above, Sch. V. 23.

**Sch. V. 27.** Modern MS, Europ. paper, quarto, 312 pp. of 20 lines.

A collection of different stories, *"Bunga Rampai"?*

Written at Bogor (Buitenzorg), 9th Safar A. H. 1264—16th January A. D. 1848. Cf. Batavia, lxxvii, styled "Bunga Rampai." The stories in both texts are the same, only differing in the order. Other MSS. Leiden.

**Sch. V. 28.** Modern MS, Europ. paper, quarto, 138 pp. of 15 lines.

*Hikayat Pĕlandok Jĕnaka.*

Finished 15th Rabiu'lakhir 1263 A. H. Cf. Batavia CXVI. Other MSS. Leiden, London.

**Sch. V. 29.** Modern MS, Europ. paper, quarto, 162 pp. of 13 lines.

*Kitab sa-ribu Masaalah.*

Finished 27th Jumadi'lakhir 1821 A. D. (no Moh. year.) Cf. Batavia, ccc—cccvii. Other MSS. Leiden, London. Cf. G. F. Pijper, "Het boek der duizend vragen," Leiden, 1924.

**Sch. V. 30.** Modern MS, Europ. paper, big quarto, 61 pp. of 19 lines.

*Hikayat cheritĕra daripada Rasul Allah.....tĕtĕkala ia bĕrpĕrang dĕngan Raja Handak dan Raja Bĕdar.*

Finished 11th Jumadi'lakhir 1263 A. H.—3rd April 1847. Cf. Batavia cclxxxi—ccxci. Other MSS, Leiden.

**Sch. V. 31.** Modern MS, Europ. paper, quarto, 175 pp. of 15 lines.

*Hikayat chĕritĕra daripada Rasul Allah.....tĕtĕkala miraj ka-langit dĕngan titah firman Allah.*

Finished A. H. 1261—A. D. 1845. Cf. Batavia cclxiii—cclxx and cmx. Other MSS. Leiden, London, The Hague.

**Sch. V. 32.** Modern MS, Europ. paper, quarto, 122 pp. of 17 lines.

*Hikayat.....Rasul Allah.....miraj ka-langit.....*

Finished 5th Rejab 1262 A. H.—10th July 1845 A. D. Same story as above Sch. V. 31.

**Sch. V. 33.** Modern MS, Europ. paper, quarto, 147 pp. of 13 lines.

*Hukum ẓanun* pada sĕgala nĕgĕri yang bĕsar-bĕsar dan pada sĕgala nĕgĕri yang kĕchil-kĕchil.

Finished 12th June 1837—12th Rĕjab 1252 A. H.

*Introduction*: The state must have four high dignitaries, the Bĕndahara, who rules over the other dignitaries, the court-officials and the young noblemen; the Tĕmĕnggong, who is responsible for the safety of the country, police and justice; the Shahbandar, who has to take care of all strangers and orphans, and the Pĕnghulu Bĕndahari (nothing said about his office).

(Ch. 1) Adat mĕjlis sĕgala raja-raja dan pakaian sĕgala raja-raja. Dress-prohibitions, etc.

(Ch. 2) Hukum bahasa. About the use of the proper words to be used in court, forbidden words and expressions, etc.

(Ch. 3) Hukum sĕgala orang bĕsar. May not carry sticks or umbrellas without the sanction or investment of the king, may not throw money amongst the people, etc.

(Ch. 4) Hukum nĕgĕri dan anak sungai dan dusun yang taalok. Only the king has the right to pass sentence on murder, robbery, theft, etc.

(Ch. 5) Penalty for killing a man without the king's knowledge.

(Ch. 6) Penalties for running amok, jurisdiction of the Měntěris regarding pardoning of offences, etc.

(Ch. 7) Hukum mĕrdika mĕmbunoh hamba orang. Penalties for freemen for killing bondsmen, etc.

(Ch. 8) Mĕnĕtak orang dan mĕnĕmpar orang. About fights between freemen and bondsmen, and manslaughter.

(Ch. 9) Exceptions, when the Bĕndahara, the Tĕmĕnggong, the Shahbandar and the captain of a vessel at sea may kill.

(Ch. 10) Hukum mĕmbawa biduan, anak muda, dan sakai atawa hamba orang mudik sungai dĕngan tiada sa-tahu pĕnghulu nya. Penalties for taking servants, young children, slaves, etc. up country without the knowledge of the respective head of the family.

(Ch. 11) Hukum orang mĕnchuri masok kadalam kampong orang. Penalties for burglary, etc.

(Ch. 12) Hukum sĕkalian orang yang mĕnawar anak istĕri orang dan hamba. Penalties for seduction, etc.

(Ch. 13) Hukum orang lari dan orang yang mĕnyĕmbunyikan hamba orang. Penalties for absconding slaves and for giving shelter to run-away slaves, etc.

(Ch. 14) Hukum orang bĕrtudoh-tudohan dan sangkal-mĕnyangkal. Mutual accusations and denials.

(Ch. 15) Upahan bĕrjual atawa naik kayu atawa mĕninggal. Liability for other peoples slaves, taken against payment into one's service, and who meet with accidents, etc.; refers also to domestic animals, tools, etc.

(Ch. 16) Hukum fitnah. Manslaughter in case of adultery.

(Ch. 17) Hukum orang mĕngambil upahan mĕmbunoh orang atawa mĕnĕmpar orang atawa mĕmalu orang. Penalties for hiring persons to kill or beat other people, etc.

(Ch. 18) Hukum orang angkara, yang maharaja lela. Penalties for mischievousness, seducing other peoples' brides, etc.

(Ch. 19) Hukum sĕgala buah-buahan didalam kampong orang atawa didalam kota nĕgĕri. Distribution of fruits grown in the village or town, penalty for unauthorised sale, lien, etc.

(Ch. 20) Hukum tanah pĕrhumaan. Land-law, discriminating between "tanah mati," land in abeyance, and "tanah hidup," land on which there are marks of proprietorship.

(Ch. 21) Hukum kĕrbau dan lĕmbu yang nakal. Liability for vicious cattle, buffaloes, etc., indemnity for killing cattle, damage caused by fire, also to other peoples' fences when burning off the fields, stealing of fences, etc.

(Ch. 22) Hukum orang binasa dan orang lapar karna nĕgĕri ini. Invalidity of selling oneself in case of famine, idem in case of

rescue from shipwreck on sea, the duty of feeding slaves properly, the return of ships found adrift on sea, etc.

(Ch. 23) Hukum orang yang mĕnchuri hamba orang. Penalties for the stealing of slaves, also for captains guilty of that crime. Contains also the "hukum orang yang bĕrwakil," over substitution.

(Ch. 24) Hukum pĕrĕmpuan. On marriageableness, jurisdiction of the parents, wardship.

(Ch. 25) Hukum saksi pada nikah. On witnesses at a marriage.

(Ch. 26) Hukum khiar. Rules about invalidity of the marriage in case of mental disease, leprosy, etc.

(Ch. 27) Hukum talak. Rules for divorce.

(Ch. 28) Hukum gantang, chupak dan sĕgala hukum pasar. On weights and measures, market-regulations, etc. All this is ruled by the Shahbandar.

(Ch. 29) Hukum orang bĕrniaga dan haram atas sĕgala yang mĕngambil riba. Laws against usury, against doing business with lunatics, children, or slaves, without authorisation of their master, re-purchase and redemption, etc.

(Ch. 30) Hukum bĕrjual tanah. In case of sale of land: on the trees standing thereon, their fruits, on children of newly-sold female slaves, faults in slaves which make the sale invalid, etc.

(Ch. 31) Hukum orang mĕngalas, On the right of disposing only over part of one's property (?).

(Ch. 32 and 33 missing, or the remainder is faultily numbered).

(Ch. 34) Hukum orang ikrar. On bearing witness and acknowledging (?).

(Ch. 35) Hukum orang murtad. On renegades. (Written twice).

(Ch. 36) Hukum saksi. On witnesses in court, etc.

(Ch. 37) Mĕnyatakan minta di-tuntut. On debts, prosecuting for debts, etc.

(Ch. 38) Hukum akil balagh. If a freeman kills an unbeliever, it is not necessary to pass sentence of death on him.

(Ch. 39) Hukum zina. On adultery.

(Ch. 40) Hukum mĕmaki orang haram zadah. Penalty for calling a person an illegitimate child.

(Ch. 41) Hukum minum arak dan tuwak. Penalties for drinking intoxicating liquors.

(Ch. 42) Hukum sĕgala orang yang bĕrtanam-tanam. Regulations for proprietors of cultivated fields, damage through straying cattle, etc.

(Ch. 43) Hukum banda orang. Regulations about treasure trove; determination of the expressions "rampas," "judi," etc.

(Ch. 44) Hukum segala orang bĕrutang. On debt-slavery, death of the debt-slave during work to pay off the debt, regulations for redemption, etc.

Bab pĕri mĕnyatakan hukum dan dĕnda segala anak raja-raja. Penalties and fines for princes.

Bab pĕri mĕnyatakan hukum jong dan balok dan pĕrahu. Maritime law and regulations on board ship.

(1) Officers on board, their rank and duties. Immoral offences on board.

(2) Distribution of things found on sea, rewards, etc.

(3) Rescue from shipwreck and rewards.

(4) Mutiny and conspiration, jurisdiction of the captain.

(5) Debtors on board.

(6) On the Malim (chief-officers).

(7) Hukum kiwi. Right of the supercargo.

(8) Bĕrmodal kiwi. Share in the venture by the supercargo.

(9) Adat sĕgala orang bĕrjong pĕri ada dudok di-balai lintang di-balai bujur. About the right to a seat on the bench anthwartship and on that lengthways the ship (?).

(11) Hukum sara. Shares of the sailors in the cargo; regulations, when the captain may sail without the supercargo, and vice versa, in case of the monsoon setting in, calling at ports, etc.

(12) Hukum orang mĕngambil ayum. Bottomry-regulations.

(13) Pĕri mĕmĕliharakan api didalam pĕlayaran. Fire-places on board the ship during the voyage, etc.

(14) Hukum pĕnchuri didalam jong. Over theft on board.

(15) Hukum orang bĕrdĕkat petak maka kahilangan-nya ia. Theft of the cargo?

(16) Hukum adat akan hak sĕlamat. Captains-premium? "Ka-Jawa lima-ratus pitis niaga dan pĕnginep-nya dua lachur dan rotan dua gĕlong. Ka-Timor tujoh-ratus pitis niaga. dan pĕnginep-nya tiga lachur dan rotan tiga gĕlong. (?)

(17) Adat sĕgala tukang. Liability of craftsmen, etc.

Adat orang bĕrburu. Hunting-regulations.

Adat orang mĕnyiding. Regulations for hunting deer with rotan-nets or fences.

Adat orang mĕngambil ikan. Fishing-regulations. etc., etc. Cf. Batavia cccxci, ccc xcii, cccxciv. There are other MSS in Leiden and London, but as it is nearly impossible to find out from the catalogues whether the contents are identical with that of Sch. V. 33, I thought it better to give a full table of the contents of the latter.

**Sch. V. 34.** Modern MS, Europ. paper, quarto, 166 pp. of 19 lines.

*Theological work.* Arabic, written in red ink, with an interlinear Malay translation in black ink. Many prayers; corrections and notes on the margin. On the cover a chapter over arcana "jika pĕrempuan itu sĕlira-nya sĕjuk atawa bĕrayer" etc.

Without date.

**Sch. V. 35.** Probably Chinese paper, quarto, 113 pp. of 21 lines.

*Theological-philosophical work*, written for the improvement of the faith by Muhamad Zain, son of the Fakih Jalala'ddin, of the sect of the Shafeites, a native of Acheh (author of Batavia dcxxxix).

Without date.

**Sch. V. 36.** Modern MS, Europ. paper, quarto, 207 pp. of 13—14 lines.

*Hikayat bab al-akal.*

Without date. Cf above, Sch. V. 7, of which it may be a copy.

According to a note lying in the book by Prof. Dr. Snouck-Hurgronje pp. 10—25 are superfluous, as p. 26 connects with p. 9, and the text of pp. 10—25 is repeated on pp. 58—76, line 12.

**Sch. V. 37.** Apparently an old MS, written on parchment-like paper.

*Divination-book.*

On page 1 and 2 a double circle, divided into 40 sections, the outside sections numbered 1—40. The outer circle contains questions in Malay, the inner circle Arabic sentences, f.i.

1 Outside: Sahabat itu baik-kah tiada baik-kah?

1 Inside: Bismillah alrahman alrahim.

2 Outside: Kĕlakuan itu baik-kah tiada baik-kah?

2 Inside: Alhamdu lillahi rabi al-alamin. etc., etc.

In the centrum of the circle the following numbers are grouped into two lines as follows:

2 7 9 5 1.
10 4 6 8 3.

The following 25 pages contain explanations in 40 sections. At the beginning of each section stands one of the Arabic sentences of the inner circle. (No explanation is given as to how in reply to a question the Arabic sentence has to be found which marks the section under which the answer is given).

On the following page are two calendar-schemes, the one marked "Wednesday-reckoning," the other "Thursday-reckoning." In both tables on the right side the twelve Mohamedan months are written one underneath the other. Above are the eight letters.

dal wau ba dal za jim ha alif with their numerical value
4 6 2 4 7 3 5 1

there under in 8 x 12 squares the days of the week, beginning above, from the left, once with Khamis (Thursday) and on the other table with Arba (Wednesday).

Next to it, on the other page, is a table marked " takwin." It contains, on the right side, the twelve Mohamedan months, written one underneath the other, beginning with Moharram, on the left side the twelve European months, beginning with August, and between the numbers 3 1 7 5 4 2 1 6 5 3 2 7 with the corresponding letters as above. Above, the numbers and letters as on the other tables, and underneath the days of the week.

On the next page a chapter on the occurring of strong winds, wherein for each month of the year the date is given when they are to be expected.

Then follow 3½ pages containing 11 paragraphs in characters I do not understand. (Buginese?)

Without date. An indication of its origin may possibly be found in a note on the last page: Ini surat chap daripada Sĕri Paduka Ratu Gusti Ngurah Madi Karang Islam, yang ada bĕrtakhta kĕrajaan didalam daërah nĕgĕri Bali, Bobĕleng, Kota Singaraja. The drawing of the seal, however, is missing.

**Sch. V. 38.** Europ. paper, quarto, 100 pp. of 17 lines.

*Umdat Al-muhtajin.* A theological work.

Without date. Cf. Batavia dccv—dccx. Other MSS: Leiden.

**Sch. V. 39.** Europ. paper, quarto, containing 32 pp. of 21 lines Arabic text; 36 pp. (somewhat smaller) of 17 lines Malay text perhaps the translation of the Arabic text).

*Theological work.*

Without date.

**Sch. V. 40.** Modern MS, Europ. paper, quarto, 41 pp. of 12 lines.

*Shaër Kupu-Kupu* about 250 quatrains.

A love-epic in butterfly-apologue.

Without date. Cf. Batavia cdlxxxv?

**Sch. V. 41.** Modern MS, Europ. paper, quarto, 57 pp. of 17 lines.

*Shaër Mekah.*

Narrates in about 475 quatrains the pilgrimage to Mekah and Medina.

Written at Padang, 30th Jumadi'l-awal 1266 A.H.—13th April 1850 A. D. Cf. Batavia dxi—dxiii, styled " Shaër Haj."

Other MSS: Leiden.

**Sch. V. 42.** Modern MS, Europ. paper, quarto, 39 pp. of 10—11 lines.

*Religious Shäer,* about Mohamed, his friends, admonition to pray, etc.

Finished in 1843.

**Sch. V. 43.** Containing several MSS.

(*a*) Modern MS, Europ. paper.

*300 pantuns* in romanized Dutch transcription.

Cf. below, Sch. V. 49, the pantuns of which are identical with those of this MS.

(*b*) Modern letter paper, octavo, 33 pp. of 24 lines.

*Shaër Mělayu Palembang.* Romanized, Dutch transcription. Narrates in about 200 quatrains the story of a Chinese captain of Palembang who, on 27th August 1842, was caught in an attempt at smuggling and forfeited his cargo.

Probably written by a Chinese. The spelling is very faulty, and compelled by the rhyme the writer has sometimes used words the meaning of which he was not quite sure of himself, so he put what he wanted to say in parentheses.

Written in 1845.

(*c*) Modern letter-paper, octavo.

Title. "*Sakit hati,*" 13 pantun bĕrkait.

(*d*) title "Pantun Bima (*Sumbawa*)", 28 quatrains in Dutch romanized transcription, in a language unknown to me.

**Sch. V. 44.** Modern MS, Europ. paper, long-octavo, 91 pp. of about 15 lines.

(*a*) 10 pp. *Hikayat putĕri Salamah* Cf. above, Sch. V. 24, B.

(*b*) 15 pp. *Hikayat Iblis* Cf. above Sch. V. 24. C.

(*c*) 17 pp. *Hikayat Bulan bĕlah dua.*

Cf. Batavia, cclxxi—cclxxiii. Other MSS: Leiden, London.

(*d*) 23 pp. Tabir Numpi.

Cf. Batavia dcccxi—dcccxiv. Other MSS: Leiden. The Hague, Cambridge.

(*e*) 3 pp. *Surat Tamtsil.*

A shaër of 19 quatrains, admonitions for husband and wife to give alms, etc.

According to a note on the title-page the book was the property of Agus Ahmat, and was written in the year Dal, A. H. 1261.

**Sch. V. 45.** Contains according to the title incomplete Malay MSS, quarto 148 pp. of 21 lines. There are 203 pp. of 15 lines, in another handwriting (?).

According to a note by Dr. C. Snouck Hurgronje the pages should be ranged as follows:

1—148 } connection between 148 and 209 missing.
209—328 }
189—208
149—188
329—352.

The MS begins with kuras (book of 24 pages) No. 9.

*Theological work*, with religious and moral directions; many Arabic words.

**Sch. V. 46.** Palm-leaf MS, Javanese (Balinese?) characters not Malay.

**Sch. V. 47.** Portfolio with sundry MSS.

(*a*) Europ. paper, quarto, 102 pp. of 15 lines.

Title: *Hadith nabi* (tiada lĕngkap).

Cf. Batavia ccxlix—ccl, styled "Hikayat nabi." Other MSS: Leiden.

(*b*) Old, parchment-like paper, 20 pp. text written in the middle of the page and above, below, right and left on the margin; 8 pp. text written in the middle of the page only.

Title: *Kitab faraidl* (tiada lĕngkap) over the division of inheritance (incomplete). Ends with the sentence: Ini surat pĕri fakih kasar-nya, Abdurrahim nama-nya, nĕgĕri Mĕngkasar nĕgĕri-nya.

Cf. Batavia, ccxlii—ccxlviii. Other MSS: Leiden.

6 pp. *Hukum Djaalah.*

"Maka djaalah itu dua pĕrkara, suatu arti pada loghat, kadua pada shariat." Over reward for bringing back run-away slaves, with an appendix regarding women whom to marry is forbidden by the law.

(*c*) Title "*Hikayat Fatimah,*" (tiada lĕngkap).

After 17 pp. the story of the daughter of the Prophet is discontinued, then follow attempts in writing and rhyming with the beginning of a shaër describing the unhappiness of the writer who had moved to Semarang.

(*d*) Title on the cover "*Hikayat Nur Mohamed.*" inside "Hikayat chahaya Nur Mohamed." (Europ. paper, octavo, 17½ pp.)

Cf. Batavia, ccxlii—ccxlviii. Other MSS: Leiden.

(*e*) Small, damaged booklet in octavo.

On the cover, in Dutch. "Geschiedenis van Fatimah, dochter van den prophet Mohamed." Some directions for prayers, then follows the "*Hikayat Fatimah,*" and more directions for prayers conclude the MS.

Cf. Batavia, cclx—cclxii, styled "Hikayat nabi mĕngajar anak-nya Fatimah." Other MSS: Leiden, London.

(*f*) Europ. paper, quarto, pp. of 17 lines.

On the cover *Hikayat Sirat al-kiamat* (tiada lĕngkap). 67 connected pp., the end of a MS dated 4th Jumadi'lawal 1241 A.H., in the year Wau.

42 pp. same handwriting, sundry fragments.

Cf. Leiden II, 288 and 353.

(*g*) Small booklet, octavo, bound, containing some quatrains of a shaër-fragment, and about 175 quatrains of a love-shaër, interspersed with many pantuns.

**Sch. V. 48.** *Piagem* (Government-decree) engraved on a copper-plate.

Text:

Residentie Palembang.

Inilah surat piagem Gupernĕment Nederland kapada Pangeran Saribu yang mĕnjadi pĕsirah Batang Hari Bĕlitang, ia-itu wates dĕri ulu Lingkis sampai di Tambarsa.

Pĕrtama dĕri orang Lampong yang duduk di Bĕlitang, apabila ia suka pulang ka Lampong tidak boleh di-tĕgah mĕlainkan akan bĕrpindah mĕnanti akhir musim.

Ada pun yang ini habis-lah adat milir arahan sĕrta tidak lagi tĕrpakai dĕripada tibaan tukan (?) pintaan dan atur-atur dĕmikian juga jang mana disĕbut mĕraja pini (?), dan juga ada larangan sĕgala barang tanaman atawa sĕgala timbul dĕri hutan, bĕsĕrta tidak usah unjuk antaran lain dĕripada titah kami. Shahadan akan hal adat dan biasa kamu yang sĕmpurna pu (pun?) sĕkarang masih tĕrpakai, maka pĕsirah dan kĕpala-kepala lagi dapat hasil-nya yang sĕlama-sĕlama-nya, maka hĕndak-lah orang mĕnurut pĕrentah-nya yang harus sĕrta akan ajak orang isi desa pada mĕndapat peruntungan pada bĕrtanam-tanaman atawa lain ka-untungan-nya.

Tĕrbĕri di Palembang pada 25 hari bulan Mei tahun 1825.

**Sch. V. 49.** Modern MS, Europ. paper, quarto.

*300 Pantuns* in romanized Dutch transcription.

The same quatrains as in Sch. V. 43 A. The spelling is very faulty, the pantuns are rather coarse and to the point, and are probably of Batavia-origin. Amongst them a (to me) new version of a well-known theme:

Jangan sĕntara kĕmbang Kĕmboja
Kĕmbang kĕnanga saya pĕtekkan;
Jangan sĕntara di-pintu shurga.
Pintu nuraka saya nantikan.

OTHER MSS.

**Ms. Or. Oct. 1111.** Europ. paper, octavo, 174 pp. of 13 and 15 lines.

(acc. ms. 1906, 284, Bibl. Indische Instelling, Delft, presented by J. P. G. Kruijt, Gep. Ass. Res., 26-4-1889.) Dutch title "*Oendang-Oendang* van Sumatra's Westkust."

A law-code of Pĕriangan, Padang Panjang.

With a mythological-historical introduction, containing the Mĕnangkabau-legend, and many adat-sayings, ending with a panegyric on the kings of Pagar Ruyong, an enumeration of the different princes of Sumatra descending from Pagar Ruyong and who acknowledge this code. The concluding paragraph: Tamat kitab timbul Datok Kĕtĕmĕnggongan dan Datok Pĕpatih Sabatang, pada hari rĕbo, bulan Jumadi'lakhir, without year.

Then follow adat-sayings and the "Undang-undang nĕgĕri" as below in M. O. Fol. 3153, some articles of a penal code, wise sayings, etc.

(Cf. below the table of the U.—U.)

**Ms. Or. Oct. 1112.** Europ. paper, octavo, 104 pp. of 14 lines.

(acc. ms. 1906, 287, Indische Instelling, Delft.) Dutch title: "*Oendang-Oendang* van Sumatra's Westkust."

(law-code from the west-coast of Sumatra).

Dutch romanized transcription, very dialectal.

Law-code, instructions for the justice, penal-code, on the Imam, etc. Quotation from the "Bostan as-salatin").

Without date.

(cf. below the note on the U.—U.)

**Ms. Or. Qu. 1110.** Europ. paper, quarto, 145 pp. of 20 lines.

(acc. ms. 1906, 285, Indische Instelling, Delft, presented by J. P. G. Kruijt, 26-4-1889).

Dutch romanized transcription.

Title: "*Kitab oendang-oendang di-pakai orang Malajoe* (niet geheel complete).

A copy in Dutch romanized transcription of the above M.O. Oct. 1111, not complete, ends on p. 116 of Oct. 1111 with the words: "Ada lagi sĕpĕrti dahoeloe, tidak di-salin."

Without date.

(cf. below the note on the U.—U.)

**Ms. Or. Qu. 1111.** Europ. paper, quarto, 42 pp. of 17 lines.

(acc. ms. 1906, 286, Indische instelling, Delft, presented by J. P. G. Kruijt, 26-4-1889).

Dutch title: Oendang-Oendang van Sumatra's Westkust."

Malay title: *Undang-Undang* mĕnyatakan adat pusaka tua-tua.

Dutch romanized transcription, Mĕnangkabau-dialect.

Law-code, over slaves and their rights and punishment, division of inheritances, debt-slavery, etc.

Without date.

(cf. below the note on the U.—U.)

**Ms. Or. Qu. 1113.** Europ. paper, quarto, containing sundry MSS.

*Village-legends.* Dutch romanized transcription.

(*a*) 15 pp. Charita Batu Nago dĕngan Pulau Aur dan orang Sikolambai di Sawang Painan.

A dragon with magic power (naga sakti), coming from the West, swims to the coast where si-kolambai dwells, which is at Labung Bĕruk " di-sĕbĕlah jajaran Talung Batung, dalam bĕhagian Kota nan Sĕlapan, pasisir barat, sabĕlah sĕlatan." The dragon meets on his way the island Pulau Aur, and splits it in two parts. Si-kolambai fears for his son, who is busy fishing, and fights with the dragon, whom he kills with a tremendous blow. Through the will of Allah the dragon is turned into stone, and his excrements become sand-banks. Si-kolambai decides to move with his wife and child to the East into the mountains; his household-implements are turned into stone, and people still marvel at their size. The descendants of si-kolambai are still living in the mountains and come into the villages to beg, always at noon-time, and sitting silent in a house at the door, they wait until they are given something. If often disappointed, they burn down the house. They have many weird habits, can take different shapes, etc., so that one should take care not to make them angry.

(2) 37 pp. Charita Si Bujang Lĕngong mĕnjadi batu. Orang yang durhaka kapada ibu-bapa-nya.

The well-known story of the son, who leaves his home as a poor boy, returns as a wealthy merchant on his own ship, is ashamed of his poor parents and will not recognize them, and is turned into stone with his ship. The story is here told of Talug Batung luhak Pasisir sabelah Selatan.

(3) 9 pp. Charita batu bĕrtĕmbok di kampong Pandung dalam nĕgĕri Salida.

In former times there came a ship to Salida from Aches (Acheh?), and the captain and his crew were amicably received by the inhabitants of Salida. But later they started molesting the people, taking rice, cattle and fruits whenever they liked, and the inhabitants called the Dutch to their assistance, who drove away the intruders. The people of Salida asked the Dutch to settle there, which they did at Pulau Chingkuk, and a Dutch merchant built a stone house at Salida, where he did a large business. He also opened a gold-mine between Salida Pĕsar and

Salida Kechil. After many years he returned to his country, closing the gold-mine and selling his house to a native of Salida, who is still living in that house.

(4) 22 pp. Charita Bukit Chumaning dan Bukit Ikan dalam nagari Sungai Jarnih.

At Sungai Jarnih there lived a man called Si Chumaning. After a long famine he goes away in search of fruits and comes to Bukit Ikan, which is about 200 cubits high, and on the top of which he sees a tree with many fruits. He tries to climb the very steep hill; an old man warns him that he will be turned into stone, but driven by hunger Si Chumaning climbs to the top of the hill and up the tree and eats of the fruits. Suddenly feeling very weak, he falls down, but sticks about 2 cubits under the top of the hill and is turned into stone. He is still hanging there and seen from afar looks like a water-jar. Since that time Bukit Ikan is also called Bukit Chumaning; it lies midway between Sungai Jarnih and Basa.

Then follows the legend of a well near Bukit Ikan, wherein during a time of much sickness a girl disappears. More water than usual come out of the spring and forms a lake, wherein there are fishes who have their own king with his courtier. When there is much sickness amongst the people, there is sickness, too, amongst the fishes, etc.

Without date.

**Ms. Or. Fol. 404.** Europ. paper, (watermark "Bodgen and Wilcott, 1809") folio, 288 pp. of 21 lines.

*Hikayat Dewa Mandu.*

Without date. Cf. Batavia xci—xcvi. Other MSS: London, Brussels.

**Ms. Or. Fol. 405.** Chinese (?) paper, folio, 54 pp. of 29 lines.

*Fragment of a Hikayat Sĕri Rama,* without beginning and end. Starts with the fighting before Langkapura, on the day when Rawana's four youngest children fall, because Indrajit does not accompany them into the battle, and breaks off with the arrival of Bardan and Chitradan at Dewata Pura Nĕgara, whither Anggada and Nila have invited them in the name of Sĕri Rama.

Without date.

**Ms. Or. Fol. 408.** Chinese (?) paper, folio, 29 pp. of 21 lines. Two MSS.

*Undang-Undang.*

(*a*) A. H. 1161, on the 17th Jumadi'lawal, the writer has been ordered by the king to compile an Undang-Undang.

Rules and regulations for merchants, instructions for captains and harbour-authorities at the arrival of a ship, how to receive Ambassadors, etc. 14 pp.

(*b*) A. H. 1078, in the year Dal, on a Monday in the month of Rabiu'lawal, the King has ordered Datok Sĕri Paduka Tuan to compile a law-code in accordance with the commands of Allah. On theft, robbery, riots, religious instructions, the making of irrigated and dry fields, purchase and sale, "dead" and "living" land, directions for the court, officials, etc. and on flowers made of precious metals to be sent as tribute.

**Ms. Or. Fol. 409.** Three Malay documents.

(*a*) Fragment of a letter of the Captain of Hitu. Mentions Hitu, Makassar, Buton, Faulty Malay writing.

(*b*) Original treaty in Malay characters between the Jukelan of Ternate, Raja Besar deri Molucci, and the Governor-General of the Dutch East Indies, dated Batavia, 30th January 1650.

A treaty on sovereignty, and that all clove-trees in the king's state should be destroyed and no new ones planted, against a payment of 6000 reals, etc. Signed by Carel Reniersz, Joan Maetsuyker and other, and sealed with the seal of Sultan Manthar Shah.

(*c*) Original treaty in Old Dutch and Malay, dated 18th June 1638, 10th March 1639 (gedaan Ternate, Casteel Malayen) between the Sultan of Ternate and the Dutch East India Company, on commercial relations, political rights, etc.

**Ms. Or. Fol. 3150.** Europ. paper, folio, 75 pp. of 35 lines.

European title: "*Undang-Undang Palembang.*" Dutch romanized transcription.

| | | |
|---|---|---|
| Ch. 1. | Adat buiang dan gadis dan kawin | 32 §§ |
| Ch. 2. | Aturan Marga .. .. | 29 §§ |
| Ch. 3. | Aturan dusun dan berladang .. | 35 §§ |
| Ch. 4. | Aturan Kaun .. .. | 19 §§ |
| Ch. 5. | Aturan Pajeg .. .. | 16 §§ |
| Ch. 6. | Adat pahukuman .. .. | 64 §§ |

Without date. Cf. Batavia cd—cdii. Other MSS: Leiden, The Hague.

**Ms. Or. Fol. 3151.** Europ. paper, folio, 13 pp. of about 30 lines.

Dutch title: Verschillende Oendang-oendangs van Sumatra's Westkust (Ajar Hadji). Sundry *Undang-undangs* from the Westcoast of Sumatra, (Ayer Haji).

Copies in Dutch romanized transcription of sundry treaties and undang-undangs, viz:

(1) Sumatra's Westkust, dated 4th March 1795, treaty with the Raja of Ayer Haji.

(2) Without date, also of Ayer Haji.

(3) Dated 3rd Rabiu'lakhir 1206 A. H., regarding Pulau Chĕngkok.

(4) Dated Padang, 12th November 1795.

(5) Without date, from Ayer Haji.

**Ms. Or. Fol. 3152.** Europ. paper, folio.

(Presented by J. P. G. Kruijt to the Bibliotheek, Indische Instelling, Delft).

Dutch title: "Drie Oendang-oendangs van Sumatra's Westkust."

(Three *Undang-Undangs* from the West-coast of Sumatra.)

(1) Surat undang-undang adat dalam negeri.

5 pp. Dutch romanized transcription.

Over government, how and by whom disputes are to be settled, etc.

Undang-undang of 16th June 1837, which was in force until 27th December 1862 and was then being confirmed by the Dutch resident.

(2) Undang-undang adat dalam perkara bunoh.

3 pp. romanized Dutch transcription.

Over intentional and unintentional killing, and the distribution of blood-money (diyat).

Without date.

(3) Surat undang-undang adat yang bĕsando shara.

4 pp. romanized Dutch transcription.

With the consent of Resident Steinmetz compiled for the Laras IV Kota. Religious directions, on taxes payable to the priest, on zakat, fitrah, nikah, thalak, halal dan haram, who has to settle questions about them, and where and how they are to be brought forward and decided.

Without date.

**Ms. Or. Fol. 3153.** Europ. paper, folio, 2 MSS.

(from the Library of the Indische Instelling, Delft).

Dutch title: "Oendang-oendang Sumatra's Westkust."

("*Undang-undang* from the West-coast of Sumatra").

Dutch romanized transcription.

(*a*) 60 pp. Up to page 39 an introduction, partly in gnomic sentences, with something like rules for the court and forensic procedure and explanations of certain terms. Then follows an Undang-undang di-atas ampat pĕrkara:

(1) Undang-undang nĕgĕri.

(2) Undang-undang orang dalam nĕgĕri

(3) Undang-undang luwak

(4) Undang-undang nan duapuloh. All with marginal notes. Without date.

(*b*) 78 pp. Undang-undang, similar to A, containing also some articles of a penal code; some paragraphs are identical with A.

Without date. (Cf. below the note on the Undang-undangs).

**Ms. Or. Fol. 3154.** Europ. paper, folio, 103 pp. of 35—43 lines.

(From the library of J. P. G. Kruijt, presented to the Indische Instelling, Delft).

*Surat Khabar Malim Deman,* anak tuanku Raja Tuwo, mande-nya Puti Lindung Bulan dalam Kowalo Batang Muna.

Dated 1888. Romanized Dutch transcription.

A Menangkabau-version of the well-known tale, the Text differing partly from that edited by Messrs. Winstedt and Sturrock in the Malay Literature Series (Singapore 1908); partly in metrical form. Apparently not quite complete.

Cf. Batavia, dccclxxiv. Other MSS: Leiden 11, 463—479.

**Ms. Or. Fol. 3154.** Europ. paper, folio, 288 pp. of 28 lines.

(acc. ms. 1906, 294, Bibl. Indische Instelling, Delft.) Ini *Babad Tanah Cheribon,* deri Tuwan Pangeran Raja Kaprabon dipĕrsĕmbahkan kapada Tuwan Mr. S. C. H. Nederburgh, Resident Cheribon, 27th December, 1868.

A translation into (not always good) Malay of the well-known Javanese chronicle, apparently made by order of the Regent of Cheribon and presented to Dr. Nederburgh. Dutch romanized transcription.

[*Note on the Undang-undangs:* With a very few exceptions it was impossible to find out from the catalogues of Batavia and Leiden whether there are any more MSS identical with those of Berlin. The most valuable MS is probably *Oct. 1111,* of which as already mentioned above, Qu. 1110 is a Dutch romanized transcription, breaking off on page 116 of Oct. 1111. In a certain relation to Oct. 1111 stand *Oct. 1112* and *Fol. 3153,* which latter contains two MSS. A. and B. A very superficial survey gave the following results:

| Oct. 1112. | | Quarto 1110. | Folio 3153. |
|---|---|---|---|
| p. 5—12 | cf. | p. 103—108 | |
| „ 15—46 | „ | „ 111 and foll. | cf. A. p. 38—52 |
| | | „ 61—68 | „ B. „ 6—10] |

**Saechsische Landesbibliothek, Dresden.**

**Eb. 441 h.** Europ. paper, quarto, containing two MSS.

On the cover a prescription for an amulet.

(*a*) *Theological work.* 20 pp. of 17 lines.

A collection of questions which possibly may be asked concerning faith and church, religious ceremonies, obligation of ritual

washings, etc., with the answers that should be given thereto. With many notes, and an appendix of 3 pp. with sundry questions and answers, probably added from daily practice.

Without date.

(*b*) 140 pp. of 17 lines. *Treatise with religious directions and instructions.*

Without date.

**Eb. 441 i.** Europ. paper, small octavo, about 343 pp. of 7 lines.

(Some pages missing; some loose leaves lying in the book do not belong to the text).

*Prayerbook*, Arabic prayers for the different days of the week, for different purposes and different occasions. Text in Arabic, directions in Malay. The value of some prayers for the absolution of sins, etc. Contains further Arabic spells to become invisible, to obtain love and friendship (by murmuring a prayer into one's hands before shaking hands with the other party), against fever, incantations for taking medicine, etc. Direction for giving names to children in accordance with the day of the week on which they are born. Arabic spells as amulets, f.i. for strengthening the body, etc. On the institution of certain prayers which Gabriel conveyed to Mohamed, etc. Charms for staunching blood. The right times of the different days of the week for writing amulets. Amulet for invulnerability, etc.

Without date.

**Bayerische Staats bibliothek, Munich.**

(from the list furnished by the Library).

**Cod. or. mixt. 91.** 29 pp. of 12 lines in 12.°

*Three religious treatises*, without title.

(*a*) Beginning: Bab ini pĕrguruan ilm assuluk dan shihadat. 14 pp.

(*b*) Beginning: Sa-orang-orang bĕrtanya dĕri mana kaadaan sĕgala ashya. 17 pp.

(*c*) Beginning: Ma avval ulilm vaavval ulamal, yani gika (jika?) sa-orang bĕrtanya pĕrtama ilmu dan mana pĕrtama amal falgavab. 21 pp. from Catalogue Monnard.

**Cod. or. mixt. 92.** 118 pp. of 15 lines.

*The story of Raja Misr.*

(Hikayat raja Mĕsir?)

**Cod. or. mixt. 93.** *Malay letter*, written by the chieftain of a wild tribe in Borneo to Count Emil von Bentheim, at that time in the service of the Dutch Government.

In a cover of yellow silk.

**Cod. or. mixt. 94.** 151 pp. of 11 lines, 4°

*Theological treatise.*

**Cod. or. mixt. 95—98.** *Arabic-Malay Dictionary,* the words in alphabetical order, vol. I letter vol. II and *Malay-Arabic Dictionary,* also two volumes.

**Cod. or. mixt. 98 a.** *Four letters of safe-conduct,* from native princes of Borneo for Dr. Karl Brügel and his hunter, dated 1326-1327 A. H., i.e. 1908-1909 A. D.

**Stadtbibliothek zu Hamburg.**

(from a letter by Dr. W. Aichele, of the University of Hamburg)

**Brockelmann-Catalogus No. 295** (p. 153)—Orient. 10.

This MS. contains:—

(1) F. 1—66, a Mohamedan treatise on the attributes of God. The headings of the chapters in Arabic.

(2) F. 68—102 Chapters from Sujuti's Encyclopaedia of Mohamedan Science, Arabic with an interlinear translation into Malay.

(3) F. 103—117 a Sufi-treatise, written in Malay, the beginning in Arabic.

(4) F. 117—122, prayers: partly in Arabic with an interlinear translation into Malay, partly Malay: four different formal introductions for petitions to the Sultan, one form for addressing a letter to the Kadi, one for a letter to the Mufti, and one for a letter to the Ulema. Further charms and incantations.

(The MS. of 122 leaves, of very thin paper,, was the property of Joh. Fr. Winckler, since 1718 Head-pastor in Hamburg.)

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## A new Squirrel from Tenggol Island, East coast of the Malay Peninsula.

*By* C. Boden Kloss.

Director of Museums,

Straits Settlements and Federated Malay States.

**(Records of the Raffles Museum, No. 23)**

During a cruise in the S.Y. Seabelle along the east coast of the Malay Peninsula with Sir Laurence Guillemard, K.C.B., K.C.M.G., Governor of the Straits Settlements and High Commissioner for the Malay States, His Excellency permitted us to anchor for a few hours at Pulau Tenggol which is about fifteen miles off the lower coast of Trengganu in lat. 4° 49′ N.

This little forested island, about 1½ miles long and nearly 1000 feet high, is now being settled by a few Malays from the mainland who are clearing the jungle above a small bay on its N. E. side and making banana plantations, the fruit from which

they sell in Trengganu. They are also engaged in a small way in making lime from coral.

Pulau Tenggol lies well outside the ten fathom contour-line (there are regular depths between it and the mainland of 15 to 19 fathoms) and it produced, as I expected, a new race of coconut squirrel which I have much pleasure in naming after Sir Laurence.

**Sciurus notatus guillemardi** subsp. nov.

This is a small squirrel of the *vittatus* section of *notatus* approximately of the size of *S. scotti*[1] of Little Redang (the next island to the north) and *S. famulus*[2] from Pulau Dayang near Aor Island (to the south), but distinct from both in the darker rufous colour of the underparts and the tip of the tail. It further differs from *S. scotti* in having the pale element of the upper parts and the pale lateral stripe of a richer buff, the lateral stripe being also broader.

The upper parts are of about the same colour as in *S. famulus*, but the rufous pencil of the tail is more extensive while the dark lateral stripe appears less distinct owing to its lesser contrast with the darker undersurface. None of the small squirrels from the islands of the east side of the Malay Peninsula are so dark beneath as *S. n. guillemardi.*

In that the nasals do not extend posteriorly as far as the premaxillaries (thus differing from the short-snouted *S. scotti*) the skull resembles that of *S. famulus*, which it also resembles in length of rostrum.

Type. Adult female with moderately worn teeth, collected on Pulau Tenggol off the east side of the Malay Peninsula on 18th June, 1926, by C. Boden Kloss.

Specimens examined. Two males and two females of the same locality and date. (all adult).

Remarks. One of the series has the dark lateral stripes much reduced and obscured with rufous: and it is possible that this squirrel is exibiting the same tendencies as the races found on the more northern islands of Trengganu.[3]

Collector's Measurements taken in the flesh.

| | ♀ Type | ♀ | ♂ | ♂ |
|---|---|---|---|---|
| Hand and body | .. 182 | 178 | 177 | 175 |
| Tail | .. 166 | 130(imp.) | 156 | 170 |
| Hind foot, s.u. | .. 41.5 | 41 | 41 | 40 |
| Ear | .. 16 | 16 | 16.5 | 16 |

1. Kloss, Ann. & Mag. Nat. Hist. (8) VII (1911) p. 117; id., Journ Fed. Malay States Mus. IV (1911) p. 195.
2. Robinson, Ann. & Mag. Nat. Hist. (8) X (1912) p. 592.
3. Kloss tom. cit.

| | | | | |
|---|---|---|---|---|
| SKULL. | | | | |
| Greatest Length .. | 46.0 | 47.0 | 45.1 | 45.0 |
| Condylo-basal L. .. | 45.2 | 45.5 | 43.9 | 43.5 |
| Basilar L. .. | 37.7 | 37.3 | 36.4 | 36.0 |
| Palatilar L. .. | .. | 20.2 | 19.5 | 19.0 |
| Diastema .. | 11.1 | 11.1 | 10.1 | 10.2 |
| Maxillary tooth-row (alveolar) | 8.7 | 8.9 | 8.2 | 8.1 |
| Median length of nasals .. | 10.6 | 11.4 | 10.6 | 11.0 |
| Greatest breadth of combined nasals .. | 6.8 | 6.8 | 6.6 | 6.7 |
| Interorbital Breadth .. | 15.5 | 16.4 | 15.6 | 16.0 |
| Cranial breadth above roots of zygomata .. | 22.0 | 21.1 | 21.7 | .. |
| Zygomatic Breadth .. | 27.2 | 26.8 | 27.1 | .. |

## On a large specimen of the Beaked Ray Rhinobatis thouini (Lacep).

*By* N. SMEDLEY, *M.A.*

**(Records of the Raffles Museum, No. 24)**

In July of this year the Government trawler "Tongkol" obtained a female specimen of the Ray, *Rhinobatis thouini* (Lacèp.), from the Straits of Malacca. It appears to be much bigger than any other previously recorded, the total length being 8 ft. 7½ in., and the breadth of the disk 2 ft. 10 in. Day obtained a 4½ ft. specimen from the Andamans, and Bleeker gives the maximum length as 6½ ft.

Cantor, in his "Catalogue of Malayan Fishes," published in 1850, describes a new species, *Rhinobatus* (*Rhinobatus*) *ligonifer*, from a young female 1 ft. 4¾ in. long. Habitat:—Sea of Penang, Malayan Peninsula, Singapore. After calling attention to its resemblance to *Rhinobatus thouini* of Müller and Henle, he points out the difference in the pectinations of the nostrils, number of teeth, etc. but his counts for *R. thouini* would appear to be questionable, when compared with Day's figures.[1] Cantor also describes the curious form of the snout in *R. ligonifer*. "The lateral margins of the snout, a little from the apex are deeply bent inwards, and nearer the apex they are similarly, but less distinctly, bent a second time. The apex thus somewhat resembles the figure 8." Gunther[2] gives the snout of *R. thouini* as "terminating in a long narrow, cartilaginous appendage." Day's figure of *R. thouini*[3] differs from Cantor's plate (*R. ligonifer*) in the form of the snout.

1. Fishes of India, Vol. 1. p. 732.
2. Catalogue of the Fishes in the British Museum.
3. Fishes of India, Vol. II, plate XCX, 4.

The specimen here recorded agrees closely with Cantor's form except for the absence of a second constriction, which is also lacking in a smaller cast specimen in the Raffles Museum. Measurements of the expansion are as follows:—Width at constriction 2½ in., nearer apex 4 in. Length of expanded portion 6 in.

Both Bleeker and Day considered Cantor's species a synonym of *thouini*. It seems therefore that this peculiar expansion of the snout is characteristic of the female of that species.

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## Spolia Mentawiensia

### (Records of the Raffles Museum, No. 25)

**Birds.** By F. N. Chasen, M.B.O.U. and C. Boden Kloss, M.B.O.U. C.M.A.O.U. *Ibis, April, 1926, pp. 269-305 (Plate III and Text-figure 10).*

This article is an account of the birds collected by the Raffles Museum expedition to the Mentawi Islands of Siberut and Sipora, off the west coast of Sumatra, in 1924.

Eighty-two forms were obtained of which eleven are described as new, viz:—

Butorides striatus sipora,
Spilornis elgini sipora.
Otus bakkamoena mentawi.
Calyptomena viridis siberu.
Hypothymis azurea sipora.
Dicrurus leucogenys siberu.
Oriolus chinensis sipora.
Oriolus chinensis siberu.
Oriolus xanthonotus mentawi.
Chalcostetha calcostetha siberu.
Aethopyga siparaja siberu.

*Pycnonotus plumosus inornatus* Bp., is revived as the name for the bird with yellow irides inhabiting the Sumatran area.

The account is prefaced by a short introduction by Mr. Boden Kloss, Director of the Raffles Museum, Singapore (vide antea p.). Before this visit the birds of Sipora had been collected by Dr. E. Modigliani in 1892, those of North and South Pagi by Dr. W. L. Abbott and Mr. Kloss in 1902: those of Siberut were unknown. Ever since his visit to the Pagi Islands the latter had desired to visit Siberut; but sanction had been withheld by the Netherlands India Government on account of the attitude of the Indonesian inhabitants, the last in the group to come under administration. In 1923, however, Mr. Kloss and the late Dr. J. C. Moulton obtained permission to visit the island, but their joint plan was

upset by the transfer of the latter from Singapore to Sarawak and the project was carried out a year later by the former and Mr. N. Smedley, Assistant Curator, Raffles Museum.

The authors of the paper consider that little is left for the next ornithological visitor to discover, except perhaps amongst migrants and shore-birds. They have been deliberately conservative in describing new forms, but believe that the systematist who compares the collection with adequate material from the neighbouring islands will distinguish several others. On this account they do not regard as final either their discussion of this particular collection or the "List of Mentawi Birds" which they have compiled. The paper ends with a list of previous literature dealing with the birds of the Mentawi and neighbouring islands. It is illustrated by a map and a coloured plate of a new subspecies of Serpent-eagle, *Spilornis elgini sipora*. C.B.K.

**Reptiles and Amphibians.** By Malcolm A. Smith, M.R.C.S., L.R.C.P., F.Z.S., *Ann. and Mag. Nat. Hist. (9) XVIII, pp. 76—81, July 1926.*

This report on the results of the Raffles Museum's visit to the Mentawi Islands, West Sumatra (vide antea p. 168) deals with the species obtained which had not hitherto been met with on the Mentawi Group. Species previously known from the islands (many of which were also secured) have been discussed and listed in de Rooy's Reptiles of the Indo-Australian Archipelago, vols. I and II (1915 and 1917) and van Kampen's Amphibia of the Indo-Australian Archipelago (1923), supplemented by a short account by de Rooy of a few Reptiles collected on Siberut Island (Zool. Mededeel. VI, 1922, pp. 219,, 231-238).

The following species had not been recorded from the islands before the visit now dealt with:—

LIZARDS.

*Draco formosus*, Bouleng. Siberut.
————*fimbriatus*, Kuhl. Siberut.
*Varanus salvator* (Laur.), Sipora.
*Gekko monarchus* (D. and B.). Siberut, Sipora.
*Emoia atrocostatum* (Lesson). Siberut.

SNAKES.

*Xenopeltis unicolor*, Reinw. Siberut.
*Sibynophis geminatus* (Boie). Siberut.
*Dendrophis formosus* Boie. Siberut, Sipora.
*Maticora bivirgata* (Laur.). Siberut.
*Trimeresurus gramineus* (Shaw). Siberut, Sipora.
*T. puniceus* (Boie). Siberut.

AMPHIBIANS.

*Rana kuhli,* Schlegel. Siberut.
————*macrodon,* Kuhl. Siberut.
*Polypedates leucomystax* (Kuhl). Siberut.
*Philautus pictus* (Peters). Siberut.

The following species are discussed:—*Mabuya rugifera, Dasia olivacea, Rana chalconota* and *Philautes horridus.* New forms described are *Boiga nigriceps brevicauda* and *Calamaria klossi.* The genus *Phrynella* is sunk in *Kaloula* and the new name *K. boulengeri* is proposed for *P. pulchra* Blgr., as in *Kaloula* the species name *pulchra* is already occupied by *K. pulchra* Gray.

The reptiles and amphibians of all the West Sumatran chain are distinctly Sumatran, though a few species (one or two of peculiar distribution) are known from them which have not yet been discovered on the larger island. C. B. K.

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## John Coney Moulton

*Obiit 6th June, 1926.*

John Coney Moulton, born in the West Country in December, 1886, and educated at Eton and Magdalen, came to Malaysia in February 1909 as Curator of the Sarawak Museum. Prior to his leaving England he had been associated with the 1st Wilts Volunteer Rifles and in February 1915 he was granted special leave to rejoin his regiment, the 4th Wilts. He served in India until August, 1916, in which year he gave up his Curatorship and came to Singapore. Captain Moulton served as Staff Officer to Local Forces, Straits Settlements and Federated Malay States, until 1919, when he resigned his commission, retiring with the rank of Major and the O.B.E.; and in July was appointed Director, Raffles Museum and Library, Singapore. He resigned this appointment in October, 1923, to return to Sarawak as Chief Secretary to Government, Member of the Supreme Council and Judge of the Supreme Court. He acted as President of the Council of Administration until October 1924, when he became a member of the Council Negri. While in Singapore Major Moulton was Organising Secretary of the Malaya-Borneo Exhibition, held during the visit of the Prince of Wales to Singapore in 1922, and later he was Chairman of the Malayan Section of the British Empire Exhibition. He took his D. Sc. (Oxon) in 1924. He had been for years a Fellow of various learned Societies.

Moulton's first six years in Borneo were busy ones. He founded the "Sarawak Museum Journal" in February 1911 and his last contribution to it was published in Number 6 of September 1915. He made several collecting expeditions to remote parts and unclimbed mountains of Sarawak and ascended Kina-

balu in British North Borneo. Even after taking up the Singapore appointment Borneo seems to have retained first place in his affections, for he visited it twice more while in charge of the Raffles Museum. In 1923, however, the writer persuaded him to break fresh ground in a joint expedition to the little-known Mentawi Islands to the West of Sumatra but the plan was brought to naught, as far as Moulton was concerned, by his transfer to Sarawak. Thereafter his executive duties confined him, save from home leave, to that State; and though he had hoped to find time to continue his zoological studies that proved impossible and the only papers he produced during his second residence in Kuching were short ones on Cicadas collected in Sumatra and the Mentawi Islands.

Moulton became a life member of the Straits Branch of the Royal Asiatic Society in 1909 and was elected to the Council in 1916: from 1920 until he left Singapore he was its Honorary Secretary. He was responsible for a large increase in the membership in 1921 and in 1922 he was the prime mover in bringing about the change of name from the "Straits" to the "Malayan" Branch.

As a zoologist Dr. Moulton specialised in Rhopalocera and the Cicadidae, but he also took much interest in Birds. In 1914 he published a "Guide to the Collection of Bornean Birds in the Sarawak Museum (Sarawak Government Printing Office, pp. 1—222) and a "Handlist of the Birds of Borneo" (Journ. Malayan Br., R. A. S., No. 67, pp. 125—191). In 1922 he produced for the Raffles Museum a guide to "Malaysian Ungulates." Most of his papers appeared in the Journals of this Society and the Sarawak Museum, but he contributed a few articles to European periodicals and also papers on the Danainae and Cicadidae to the Journal of the Federated Malay States Museums in 1921 and 1923. In these latter are listed and discussed all the Danainae Butterflies and Cicadas of the Malaysian subregion, exclusive of Palawan. During his Directorship of the Raffles Museum and Library the staff was increased and his representations to Government resulted, after his departure, in a considerable extension to the building.

Dr. Moulton died in London on the 6th June, 1926, at the age of forty, a few days after being operated on for appendicitis. C. B. K.

# Ceylon Malays

*By* CAPTAIN H. M. SAID, *S. M. J.*

The origin of the people in Ceylon who call themselves "Malay" is somewhat obscure.

Some find that they may have sprung from people who came from Java many years ago. They know that there was one Tuan Pengiran who was buried at a Cemetery in Colombo, Fir Shahib Makam, and whose corpse was afterwards exhumed and transferred to Java. The then Dutch Government fired salutes in honour of the deceased from the place of burial up to the arrival of the body on board the ship.

If one refers to Vol. II of the "Indian Archipelago" written by Mr. Crawfurd, in the chronological Table under the year 1722 A.D. on page 546, there is a paragraph which reads as follows:—

"The Javanese princes and chiefs, in revolt against the Dutch and the Susunan, surrender themselves at Batavia to the number of forty-four persons, and are banished to Ceylon and the Cape of Good Hope—thus ending the first war of Java, which, for a period of near twenty years, continued to desolate the finest parts of the island."

And there is another passage on page 548 under the year 1733 A.D. reads:—

"Danurajo, first minister of the Susunan, having thwarted the ambitious designs of the Dutch, incurs their displeasure, is given over to them, and banished to Ceylon."

Further, on page 554 under the year 1753 A.D. it is stated:—

"The rebel Javanese princes, Mangkubumi and Mangkunagoro, quarrel and seperate.—They fight a battle in Pronorogo, and Mangkubumi is defeated."

"The Dutch make overtures to Mangkunogoro, sending him, as a bribe, the body of his father, brought, for that purpose, from Ceylon, where he had died in banishment!"

There is no doubt that the transfer of the body referred to above by the Ceylon people is correct and as it refers to a prince (Tuan Pengiran) it should be one of the princes banished in 1722.

Is it correct to suppose that all the Malays in Ceylon came from Java and if so, why should they be called "Malays" when they are in reality Javanese?

Meeting Ceylon Malays there one cannot help noticing that some of them have the features of Javanese while others look like Malays and their personal names incline to both Javanese and

Malay. These give an impression that there were some pure Malays residing in Ceylon either before or later than the Javanese referred to. It is more likely to be prior to the banishment of the Javanese. Otherwise they would not be called "Malays"; Now the first appearance of the Portuguese in Ceylon dated back as far as 1505 A.D. when the Island was divided under no less than seven separate Rulers. The Portuguese remained there for about 150 years and were succeeded by the Dutch who expelled the Portuguese in 1656 A.D.

On the other hand the Portuguese conquered Malacca in 1511 A.D. and remained there until the Dutch took it in 1642. Malacca was attacked and blockaded during Portuguese rule on several occasions by the former Malay King of Malacca and his Laksamana (Admiral), by Achin and by the Dutch with Malay allies.

A passage on page 493 of Crawfurd's work under the year 1523 reads as follows:—

"Malacca, surrounded by enemies, is cut off from supplies, and suffers from famine. The celebrated Laksimana, taking advantage of the circumstance, and the absence of the Portuguese shipping in quest of provisions, comes into the roads, and burns a Portuguese ship in presence of the garrison.

The Laksimana captures two ships sent against him by the governor of Malacca.

The king of Bintan invests Malacca with a fleet and army, the former commanded by the Laksimana, and consisting of twenty thousand men, and the latter by a renegade Portuguese, and consisting of sixty thousand.

Alphonso de Sosa arrives at Malacca, and relieves the city; he blockades the Laksimana in the river Muaru;—he sails for Pahang, where he destroys all the merchant vessels lying there among other numerous trading vessels of Java; he kills six thousand persons at that place, and *takes prisoners in such numbers as afford to every Portuguese six slaves*. He sails, finally, to Patani, and commits depredations still more extensive, reducing the whole town to ashes."

The words 'six slaves' remaind one of a place in Colombo called "Slave Island" where many Malays have resided for several generations. The Ceylon Malays have applied to the Municipality to change this old designation to some more suitable name.

Now Alfonso de Sosa may have brought those so-called slaves to Ceylon and placed them at a spot which was afterwards called 'Slave Island.' The Dutch must have followed the precedent of the Portuguese by banishing the Javanese princes and others to the same place in later years. The Malays and Javanese naturally inter-married and as in Singapore were proud to call

themselves Malays, although there are some people in Singapore who prefer to call the issue of such inter-marriages *Jawi Peranakan* or *Jawi Pekan*.

Although the origin of the Ceylon Malays may be from banishees and slaves yet their claims to have been related to princes in the past are not therefore exaggerated.

The Dutch practice of banishing people from the East Indies to Ceylon and Cape Colony may well have followed that of their predecessors, the Portuguese, who were the first to discover the sea route round the Cape of Good Hope in 1487. It is possible therefore that the Malays both in Ceylon and the Cape of Good Hope are sprung originally from Malays of Malacca banished or taken thither by the Portuguese.

[*Note.* The *Malay Mail* of October 17, 1924, summarizes a lecture by Mr. E. Reimers, Government Archivist, Ceylon, on this topic. The lecturer opined that in pre-Islamic days Malay fleets refitted at Ceylon for their voyages to Madagascar and Ormuz. Sinhalese histories of the 13th and 14th centuries referred to them. The Admiral and Captains of Prakama Bahu were Malays and Rajasingha I was said to have employed them. Malays were present at the storming of Galle by the Dutch in 1640 and at the storming of the bastion of Joan during the seize of Colombo in 1655, and at the capture of Jaffna in 1658. Dutch minutes of Council of Sept. 8, 1660, record the gift of land to 28 Javanese, who had become Christians, for rice-planting. In 1681 a house and land at Wolvendahl were given to Javanese. Christopher Sehweitzu in his Account of Ceylon (1670—1682) stated, "that there is also a company of Amboynese in Dutch service. Their lieutenant was called Alom and was of royal blood." Malays in the service of the king of Candy were probably deserters from the Dutch and later the British force in Ceylon. In 1795 before Trincomalie most of the British casualties were caused by Malays in the service of the Dutch who "crept out with their creeses at night, killed or wounded nearly every man in the trenches, spiked the guns and effected their retreat into the fort" (Percival). Before the Dutch capitulation in 1796 there were eleven companies of Malay troops in Colombo, nearly 800 strong, commanded by their own officers, and many more in the Garrisons of Battlicalo, Trincomalie, Jaffna, Mannar, Calfentyn, Negombo, Kalutara, Galle and Martra. Many entered the British service and were drafted into the Ceylon Rifle Regiment or were sent to Madras. The Malay regiment was finally disbanded in 1873. In 1803 a Lieut. Crain Sapinanie and a Captain Noordin and his brother were beheaded rather then desert the British to serve the King of Candy, the two last, claiming that they were the grandsons of a king and could not disgrace themselves by treachery.]

# A Malay's Pilgrimage to Mecca

*By* HAJI ABDUL MAJID.

The pilgrimage to Mecca is the "fifth pillar of Islam"; every Muslim who is of age has to perform it as a religious duty at least once in his life time, provided he has the wherewithal to undertake the journey. To the ordinary Malay living in a village this means that he has to be in possession of about $500 to $600 before the duty of performing the pilgrimage becomes incumbent on him; and even then he must be perfectly free from any responsibility to his family, that is, he must have means to provide for his wife and children (*kĕwajipan nafkak*) as well as his dependants (if he has any) during his absence; unless of course he takes them all along with him. Unmarried women are not expected to go on the pilgrimage unless they can form a company of sufficient number to protect themselves whilst on the journey, or have protectors from among their male relatives. Sick or aged people without physical strength need not go; yet generally there are at least 2% of these among the pilgrims every year. This obvious foolhardiness on their part is accounted for in two ways; firstly, there is a belief among Muslims that to die whilst on pilgrimage is very meritorious (*bĕsar pahala-nya*) and secondly, there is a belief that sickness or weakness does not necessarily shorten life; "a man dies only when his predestined time has come, neither one second before nor one second later," goes the saying. As to those who cannot afford the journey to the "House of God," they can console themselves with the sayings of the Prophet; "For the poor, attendance at the Friday service is equivalent in merit to performing the pilgrimage."

The pilgrimage season begins in the month of *Rajab* which does not fall on the same month in the English Calendar every year, owing to there being only 354 days in the Islamic year as against 365 in the Christian year. From the month of *Rajab* right down to the month of *Zulka'edah*, (five months) pilgrims from Malaya wend their way towards Mecca, there to await the appointed time in the month of *Zulhijjah*, when the actual "Haj" is performed. The 10th of Zulhijjah which is known in Malays as *Hari Raya Haji* is really a Holy Day for the pilgrims in Mecca.

As a rule, a Malay does not go on any journey, much less a perilous one like going to Mecca, in which he has to cross the seas (*mĕlangkah laut*), without first consulting the horoscope to find out an auspicious day on which to start from his home, so as not to encounter "dangers and foes" on the way. Then he gives a feast (*khĕnduri*) which, apart from the prayers said thereat for his *bon voyage* and safe return, serves him also as a means to meet his friends and relatives before going away. After this, he has

to get provisions ready for the voyage from Singapore or Penang to Jeddah, the port of Mecca, a voyage which lasts from 13 to 17 days. He books his passage at either of the two above-mentioned Malayan ports, and this is done through the pilgrim-brokers who receive the pilgrim at the railway station on arrival, provide him with lodging all the time he is waiting for the pilgrim ship and send him with his luggage to the ship when his turn comes to sail.

On the day of sailing, he finds that he has to be vaccinated before he can board the steamer.....a precautionary measure imposed upon him by the authorities against the outbreak of small-pox. This disease and cholera sometimes break out among the pilgrims, so that every pilgrim ship has, by law, to carry one doctor for every 1000 pilgrims, or part of that number. It is the duty of these doctors to see particularly that no outbreak of such contagious diseases occurs whilst the pilgrims are on board. Before the ships may enter the port of Jeddah, they have to call at Camaran, an island about 500 miles from Jeddah. Here every pilgrim will have to disembark and go ashore for quarantine. Even if there is a clean bill of health on board their ship, the pilgrims have to undergo quarantine, which consists of a salt-water shower-bath for them and steam-disinfection for their clothing.

The harbour of Jeddah is full of coral reefs and sandbanks so that all ships have to lie at anchor far out to sea, generally about four or five miles from the shore. From his ship the pilgrim descends into a *dhow* with all his belongings, and the dhow, manned by Arab sailors, takes him to the landing place. Here, he lands on one pier whilst all his luggage is taken to another. He has to pass through many gates before he reaches the pier where his luggage has been taken ashore. At the first gate the pilgrim is asked where he has come from and who is his *shaikh?* The latter question refers to the *shaikh* in Mecca whom the pilgrim takes as his guide. There are in Mecca about six or seven hundred of these *shaikhs* or guides, (*mutawwif* as they are also called in Arabic) and every pilgrim has to go to one. They have their *wakil* or agents in Jeddah who look after the pilgrims during their stay there. When the pilgrims have been sorted out at the first gate, they go and sort out their belongings which by the this time are being examined by the Customs officers. After passing the Customs inspection, all the luggage is carried to the various lodging houses either by porters or on donkey-carts.

The town of Jeddah is very pretty to look at from the sea at a distance, the tall buildings rising like square boxes placed on top of one another and varying in size and height in fantastic disorder. The flat roofed buildings nestle together like a lot of pigeon-lofts leaning against each other, the whole with the blue sea

as a foreground and the sky with the parched Arabian desert as a background. But inside the town! The streets are dusty, dirty and narrow. None of them are straight, except one or two main ones. They are not named, nor are the houses numbered, and as they all look almost exactly alike to the newcomer, the chances are that he will lose his way if he does not take a guide when he ventures far from his lodging-house. Another thing that one can hardly fail to notice in Jeddah is the flies; they can be seen in thousands everywhere; they swarm over everything and everybody in the houses and in the shops. At night time the mosquitoes come out in their thousands! Between the flies and the mosquitoes, the tired and weary pilgrim is harassed for twenty hours during the twenty four. Moreover, the water for which he pays dearly is not as good as water should be. Jeddah's water supply is not like that of the big towns of Malaya where reservoirs of fresh water collected from springs on some mountain or hill-side supply the needs of the inhabitants at stand pipes or by taps in the houses; nor is there any stream of fresh water as in Malayan villages. Here are big wells in large numbers just outside the town; filled not by spring but by rain from the sky. And it rains only once or twice a year. What the water is like after being in the wells for some months is better left to be imagined than described! It should be mentioned, however, that water here, and indeed everywhere in the Hejaz, becomes refreshingly cold, in fact almost as cold as iced water, after being put for a short time in earthen gogglets (*labu tanah*), which are, therefore, used in large numbers in the country.

A pilgrim does not stay, as a rule, more than two days in Jeddah. It is too much trouble for the Shaikh's agents to look after him longer; and so he is hurried to Mecca as soon as taxes have been collected and passports been attended to. Before leaving Jeddah, however, the pilgrim must be shown the Tomb of Eve which lies just outside the town, to the north-east. The tomb is more than 60 yards in length; and this, the pilgrim is told, is only one-third of the height of Mother Eve! Here the pilgrim finds a large number of men, women and children flocking round him, asking for alms. He is well advised if he takes with him on the visit to this tomb a large supply of small coins; otherwise he will find it difficult to proceed owing to the insistent clamouring of the beggars.

Before leaving Jeddah, the pilgrim has to wash himself, perform the necessary ablutions preparatory to prayers, put on the pilgrims garb (*ihram*) and say a short prayer of two *raka'ats*. The *ihram* for men consists of two pieces of white cotton cloth, neither of which must be sewn. One is used to cover the legs from the waist downwards like a *sarong*, the other to cover the body like a *baju*. The head must be left bare, that is to say, no cap

should be worn, though there is no objection to using a sunshade or an umbrella to protect the head from the sun. As to the feet, the soles can be covered but not the toes, so that the pilgrim will have to wear sandals, not shoes, if he prefers not to go entirely barefooted. For women, the principal thing in *ihram* is that they must not cover their faces; and their clothes must all be of white cotton though these can be sewn. During the time the pilgrim wears *ihram* he must refrain from all connubial relationship or companionship (a breach of which ruling will nullify the *ihram*), and must refrain in a lesser degree from cutting his finger nails or shaving the hair from off any part of his body, the penalty for any breach of which is to pay a regulated quantity of corn or a certain number of sheep to the poor.

The journey to Mecca is done on camels; two pilgrims, as a rule, on one camel. A wooden structure with an awning of date-palm leaves, known as a *shaqduf*, is put on the camel's-back and the pilgrims get into this, one on each side. One can sit or sleep fairly comfortably in the *shaqduf*, though it is too short to enable one to stretch one's legs at full length when lying down. The time for travelling is at night, owing to the great heat of the sun in the day-time practically all through the year, except during the winter months. It takes two nights to reach Mecca from Jeddah, stopping the whole day between, at a place called Bahra. This place is nothing but a collection of huts which are mostly coffee or tea shops, though one can buy other things as well, such as meat, ghee, rice, flour, cigarettes. Malays do not care to eat the rice and curry offered for sale by the Arab shopkeepers because the preparation is not to their taste; they prefer to cook their own food; and the local Bedouins knowing this bring firewood for sale right to the place where the caravan stops. This is of course some distance from the village and by the side of some wells from which the pilgrims can draw water for themselves; but the water is somewhat saltish in taste.

During the journey itself the pilgrim is not free from troubles. The camel-drivers keep on all night long hammering at the sides of the *shaqduf* calling out *mizan, mizan* i.e. "balance yourself, balance yourself," not so much because they want the pilgrims to balance themselves properly on the *shaqduf* as to find out if they have gone to sleep soundly so that they can pilfer something from the pilgrims' eatable:—the valuables will be tied up on the person of the pilgrims. Perhaps the greatest annoyance that a pilgrim experiences here is to find on waking up from sleep some time during the night that his water-bottle is empty, the water having been stolen by some camel-driver. For some reason or other, a newcomer is continually thirsty in the Arabian desert and wants a drink every ten minutes or so. Imagine, then, to yourself the chagrin of the pilgrim at finding his water-bottle empty! This experience can be made doubly annoying if the pilgrim, not

knowing the language of the Bedouins, attempts to ask them in Malay who the thief was; for all he gets from them is mimicry of his own language and a loud laugh.

Upon arrival in Mecca which is reached generally in the early morning of the second day, the pilgrim has to perform the *tawaf, sa'i* and the *bĕrchukur* before he can discard the *ihram* and get into ordinary clothes again. The *tawaf* is performed by going round the *Kaabah,* which is in the middle of the "Masjid 'al-haram" (the Mecca mosque), seven times in such a way that you keep your left shoulder, which unlike the right shoulder should not be uncovered, on the side nearest to it. The starting point of the *tawaf* is the place in line with the famous Black Stone, which lies imbedded in the north-eastern corner of the walls of the Kaabah. As the pilgrim goes round he repeats certain prayers, and when he comes back to the Black Stone he has to kiss it, or if he cannot get near enough owing to crowd, he can wave his hands towards it which will be just as good. There is another stone, not black but yellowish in colour called *Rukum Yamani* imbedded in the southern wall of the Kaabah; and the pilgrim has to kiss or wave his hands towards this stone also on his rounds, though this is not as compulsory as it is with the Black Stone. The *sa'i* is performed by walking seven times between *Safa* and *Marwa,* two hillocks just outside the Mecca mosque towards the east, about two furlongs distant from one another. At a certain point in this walk whether going or coming, the pilgrim has to "double-march" for about ten yards. A pilgrim can ride on a donkey if he is too tired to walk the whole distance; or if he is unable to ride owing to illness he can be carried in a litter. Sick people also are carried in a litter for the *tawaf,* though no donkey can be used as it is of course within the mosque. The *sa'i* done, comes the *bĕrchukur,* which is merely to shave the hair of the head. This finished, the *ihram* can be discarded and ordinary clothes put on.

The whole procedure is called the "*'umrah,*" or in Malay *haji kĕchil.* The *'umrah* can be performed by a pilgrim at all times of the year by going to Tana'im, the boundary point on the Medinah road dividing the holy land of Mecca from the rest, and putting on the *ihram,* then performing the *tawaf,* the *sa'i* and the *bĕrchukur;* except between the first of *Shawal* and the 12th of *Zulhijjah.* The more often this *'umrah* is performed, the more meritorious it is for the pilgrim; so too with the *tawaf* which by itself can be done at any time of the day and during any period of the year without having to put on the *ihram.*

The holy city of Mecca is about four or five square-miles in size, with a permanent population of about 30,000; and during the pilgrimage season there must be more than 100,000 people of nearly every nationality under the sun in it. The ground on which it is built is not flat but rather hilly with a deep ravine in

the middle. On the exact spots where Muhammad and his four Companions were born, monuments have been erected and pilgrims are shown these places by their guides. Aminah, the mother of the Prophet and Khadijah, his first wife, are buried in Mecca at a place called Ma'alah, a large cemetery on the outskirts of the town. Their burial places are also shown to the pilgrims. The cleanliness and sanitation of the town are better than in Jeddah; the houses are alike in construction and the streets are as dusty, dirty and narrow. There is the same trouble from flies and mosquitoes here as in Jeddah; but, fortunately the water is good There are underground canals conveying what is known in Arabia as "sweet water" from springs on the sides of some hills in Ta'if right to the town; these underground canals, the story goes, were built by Siti Zubaidah, one of the wives of the famous Sultan Harun-al-Rashid of Baghdad. The streets of Mecca are full of dogs, an animal for Muslims as unclean as the pig: touch them and a special ablution is prescribed before one can be considered clean again. These dogs are mongrel pariahs and can be seen everywhere, though they are quite harmless and according to the oldest residents of Mecca they have been never known to become rabid or to have bitten anyone. The writer was told that the reason for tolerating these unclean animals in the Holy Land was that they are the protectors of the Kaabah from the pollution of infidels, and they are credited with a divine intuition to recognise infidels if ever they attempt to come into the Holy Land; and woe to those infidels who are thus recognised, for it is said that these dogs will not leave off biting them until they die the miserable death that they deserve.

The *Masjid-il-Haram,* or Mecca mosque, is the principal feature of this holy city and is situated in the heart of the town where the aforesaid ravine is, so that the mosque is surrounded by hills on whose gentle slopes rise the tall dwelling houses of the Arabs. Walled in on all sides, with a roofed colonnade running round it to a depth of 60 feet from the walls; almost a rectangle in shape with the obtuse angles (very little more than 90°) at the south-eastern and north-western corners; about 640 feet in length from North to South and 440 feet in breadth from East to West, this most venerable Mosque, sometimes known as *Baitu'llah,* or "House of God," resembles in its setting an amphitheatre of olden days. It is approached by no less than twenty-two doorways, the best-known or biggest of which are the *Bab-as Safa, Bab-as Salam, Bab-az Ziadah* and *Bab Ibrahim.* Of minarets from which *muezzins* call the faithful to prayer, the mosque has seven; and there are 311 pillars to support the roof, built only for some distance from the walls inward. One of these pillars, near the Bab-az Ziadah, is known as the pillar of the Jinn *tiang jin.* For when the Prophet was building the mosque, he found that he was short of one pillar, and hunting for it here and there discovered that it

had been hidden by the King of the Jinns, who refused to give it to him unless he was paid for it with an amount of gold equal to its weight. The Prophet, anxious to have the missing pillar, agreed to pay according to the terms of the King of Jinns and placing the pillar in one of the scales he put his own ring in the other, when to the great annoyance of the King of Jinns the ring was found to be heavier than the pillar. Thereupon, the King of Jinns in great anger smote the pillar with his sword but only sliced a bit off it; and the mark of the slicing is to be seen to this day. No doubt it is a plausible story to the superstitious; but who can repress a smile when history says that it was Sultan Salim of the Ottoman dynasty who built the mosque as it stands with its 311 pillars and not the Prophet! The middle of the mosque, is an unroofed square which is gravelled and divided and sub-divided by cemented foot-paths leading from the floor at the sides towards a central flooring which forms, as it were, the base for the Kaabah. Here and there can be seen what look like pavilions, four of which are the places where the four *Imams*, of the four orthodox sects of Islam, take their stand in leading the five daily prayers. One of the others is the pulpit where the *khutbah* or sermon is preached before the Friday or Eid service; and another close to it is known as *Makam Ibrahim*, so-called because, lengend says, it was the spot on which the Prophet Ibrahim first prayed to Allah. Next to that is the walled enclosure containing the famous *zamzam* well.

The *Kaabah*, in the very middle of the mosque, is really a rock-stone cube-like structure about 36 feet in height, 32 feet in length and 30 feet in breadth. It is draped all round in black silk into whose texture is woven sundry verses from the Koran, all made by maidens and sent every year from Egypt. There is a door in the Kaabah near its eastern corner, about seven feet high, and this door is opened at certain times of the year when people are allowed to enter and mount to the floor which covers the whole space within, and which is also seven feet from the base of the Kaabah. On this floor there is no carpet, no mat or anything of the kind; and on the walls there is no inscription of any sort. But there are two pillars supporting, as it were, the top-most floor to which there is no access from the first floor, except from the outside. Hanging from this floor can be seen a few ancient relics of household requisites, such as a brass water-jug, and basin and the like, said to have belonged to the Prophet Ibrahim and the Prophet Muhammad. Mention has been made already of the black stone and the yellowish stone which are lying imbedded in the outer surface of the walls of the Kaabah and it is only left to mention the small conduit made of pure gold, the use of which is to drain out the rain-water from the top-floor of the Kaabah.

The Kaabah was erected by Prophet Ibrahim and has been repaired several times, the last time a hundred years after the death of Prophet Muhammad. It is towards this Kaabah that

Muslims from all parts of the world turn their faces in saying their daily prayers. The Black Stone is believed to have come down from Heaven together with Adam and Eve at the time of their fall, and the story goes on to say that the stone was pure white at the beginning but is now black with age or, as the superstitious have it, from the sins of Mankind. There is, however no story about the yellowish stone. The story about the zamzam well is that when Hagar, the slave-wife of Abraham, gave birth to Ishmael (Nabi Ismail) in the wilds of the desert, for Mecca was then not yet a town, there was no water to be found anywhere to wash herself with. She left the newly-born babe in the sands and ran searching for water; and on her return to the child, lo! a tiny spring gushed out of the ground as if in answer to her prayers, at the place where the baby was kicking with his tiny feet. From the small dam made in the sands to collect the water of this new spring, the present well is made and now it is more than twenty feet deep. The water of zamzam is not sweet to the taste like fresh water but slightly brackish, although the newly-arrived pilgrim is assured that it is sweet to the taste, provided he is looked upon with favour by the Almighty! The pilgrim's *sa'i* between Safa and Marwa is nothing more than a memorial of Hagar's supplications to Allah in her distress, for it was between these two hillocks that she prayed and searched for water. No description of the mosque can be complete without reference to the large number of pigeons seen therein. They are looked upon as semi-sacred, and the writer has never heard of their being caught and used for food, the alleged reason being that the birds are "Fatimah's pets," Fatimah being the favourite daughter of the Prophet. So these birds breed and multiply without molestation or hindrance and it is not an uncommon sight to see some one with corn or rice in his hand feeding these pigeons in the mosque as if they were poultry in a farmyard.

Other places of interest which the pilgrim visits in Mecca, besides the birth-places of the Prophet and his Four Companions and the tombs of Aminah and Khadijah, are:—(1) Jabal Kubis, (2) Jabal Nur and (3) Jabal Thur.

*Jabal* in Arabic is a mountain or high hill. The mountain known as Jabal Kubis is on the eastern side and within sight of Mecca, hardly one mile distant from the Mosque. There is a sort of cave half way up this mountain where the Head Shaikh of the sect of Muslim mystics, known as "*Tarikat Nakshabandi*," leads a somewhat austere life, away from the rest of the world. There is a spot here from which the pilgrim waves to his friends and relatives in his distant native country, mentioning their respective in his distant native country, mentioning their respective names in order that, so it is believed, their hearts may be stirred by Allah to perform the pilgrimage.

Jabal Nur lies northward about four miles away from Mecca. Here the Prophet Muhammad often went for his meditations before he received the first Divine Message and here too God's Messenger, Gabriel, appeared to him with the Message ordering him to "Read in the Name of thy Lord"———the first verse of the Koran that was sent down through the Prophet. But the story which is told to the Malay pilgrim is that it was at Jabal Nur that the Prophet, when a boy, got his heart cleansed by Gabriel of the black blood therein that represented viciousness, thus leaving him with none but the "blood" of virtues. This cleansing of the heart was repeated by the same Agent of God at the *zamzam* well with *zamzam* water when the Prophet was about to perform his famous Ascension to Heaven on the night of the 15th Shaaban (*nisfu Shaaban*) when, in addition, Gabriel put Faith into the heart of the Prophet.

Jabal Thur is about ten miles from Mecca lying southwards. At its foot is a cave in which the Prophet Muhammad took refuge whilst preparing for his first flight to Medina. His life was saved by a spider which after the Prophet's entrance started weaving its web right across the mouth of the cave so that the search party thought on one could have entered as otherwise he would have brushed away the spider's web. This accounts for the Malay's reluctance to kill a spider as the whole species is looked upon as the Prophet's friend. There is another story current in Malaya which is not corroborated in Arabia and that is, that whilst the Prophet was hiding in this cave a man among the search party took up a stone and threw it into the cave, hitting the Prophet on the mouth and breaking one of his teeth in half. The Prophet later on, not caring to be seen with a half-broken tooth filed all the rest of his teeth down to the level of the broken one. And this is the explanation offered by Malays why they have their teeth filed on coming to age———in imitation of the filing of the teeth of the Prophet!

The visit to Medina the burial place of the Prophet is one of the performances during his pilgrimage that a Malay is anxious to achieve, although it is not essential (*wajib*) according to the rules for the "Haj" (*Rukun Haji*). Their desire can be understood if one remembers the Saying of the Prophet "Those who see me alive or after death I look upon as my companions and on the Day of Judgment they will get intercession from me" (*mĕndapat shafa'at Rasul-Allah*).

Three caravans go to Medina every year, the first before the Fasting month, (Ramdan) the second after the Fasting month and the third after the "Haj." Malays generally prefer the first two, unless they mean to stay in the Hejaz till the next pilgrimage season (*mĕnaun*) and then they do not mind going by the third caravan. It is not necessary to put on the *ihram* when going to

Medina, but on coming back to Mecca it is imperative because the rule is: "Every person on entering Mecca must be in *ihram*." Conversely; "Every person on leaving Mecca must perform the *tawaf wida'*.....*wida'* means leaving or going away from.—

After performing the *tawaf wida,'* the pilgrim starts on his journey to Medina by camel. It takes twelve nights to reach Medina, stopping at eleven different places, which are in their order as follows:—Wadi Fatimah, Asfan, Doff, Qadimah, Rabigh, Mastura, Bir Shaikh, Bir Hassan, Bir Khalas, Bir Abbas and Bir Darwish. The above is the list of places along the more favourite route known as "Jalan Sultani," which was followed by the writer when accompanying the second caravan in the year 1923. The other route is known as "Jalan Ghir," which branches off on leaving Rabigh and joins the Jalan Sultani at Bir Khalas. The second route is said to be shorter but some very steep hills have to be climbed.

As in the journey between Jeddah and Mecca, the caravan travels by night, not by day, starting about three of four in the afternoon and stopping about three or four in the morning. The writer will never forget the scene on approaching the various halting-places which are lighted up with hundred of oil-lamps raised on long poles stuck in the ground or rather sand. These are the lamps of the various parties belonging to the various Shaikhs or guides who have gone ahead of the pilgrims and reached the appointed halting-place before them. When with these myriads of lights twinkling in the distance like stars in the semi-darkness of the early dawn and growing bigger as the caravan approaches and what with the music and singing, chiefly in Arabic and Hindustani, echoing and re-echoing in the wide expanse of sands, it is enough to melt one's heart and make one to long for wings to fly back to one's home there to listen to one's native music; for, strange as it may appear, Malays unlike Indians do not sing their own songs here; and if they feel at all exultant, burst out into Arabic not Malay tunes.

At daybreak, each of the halting-places looks like a small town for here are to be seen for sale anything and everything for human consumption available in Arabia, the only difference being that these "shops" are in tents, not in permanent buildings, except at Rabigh which is a fortified town and a port of minor importance. The different parties in the caravan are separated from one another, each forming a horse-shoe circle with its own shaqdufs placed one against the other on their own wooden props, the entrance to the enclosure being at the point where the circle is left uncompleted. The pilgrims will be busy all day making purchases and cooking their food, some to be taken at the halting-place itself and the rest to be carried along with them in the shaqduf. Generally these halting-places are situated at spots where there

are wells (*Bir* in Arabic) but the pilgrims are not allowed to draw water from the wells as they are the property of the local tribe of Bedouins who will come with their *qariba* or sheepskins full of water offering it for sale. At Wadi Fatimah, however, there is a small stream of fresh water, no bigger than a large ditch; and pilgrims can wash themselves or their clothes without having to pay anything. The water in all the wells at the other halting-places is passably good, except at Qadimah, Rabigh and Mastura where it is saltish, for these places are not far from the sea-coast. In fact, so near are they to the sea that one can buy fresh fish there, and between Qadimah and Rabigh one can even see the sea.

At this point, perhaps, it would be well to give a brief description of all the sights seen during the journey. Unfortunately there is very little to tell as one travels most of the time in the dark. From what can be seen during daylight, most of the country is hilly; range upon range of barren rocky hills are seen practically everywhere. Here and there, one comes across patches of flat land where corn and water-melon are grown. Date-palm groves occur wherever the land is low lying. Bedouin tents are conspicuous by their absence rather than by their presence along the road. The idea that the Bedouin are a migratory people moving with their tents from one place to another is not altogether correct as from the writer's own personal observations there is no race under the sun who love their homes and homeland better than the Bedouins. Tribes have been known to settle in one particular district for hundreds of years without ever attempting to move, no matter how rich and tempting other places even close by are. The writer has on several occasions spoken of Malaya to the Bedouins, giving them an exaggerated account of the riches and beauties of that country as compared with their barren land, where water is as scarce as gold; and though their "mouths water," so to speak, on hearing of such seemingly endless bounties of Allah, yet in the end they invariably exclaim:—"Your country may have the best that Allah can give to mankind in this world, but nothing whatever will induce us to leave home and homeland"!

We have said that it takes twelve nights to reach Medina, but more often than not it takes longer than this to accomplish the journey, delay being caused by Bedouins stopping the caravans to extort money from pilgrims. It is an open secret that the good-will of these Bedouin tribes along the Medina route, especially between Bir Hassan and Bir Abbas, had to be bought by annual grants of subsidies from the Ruler of the Hejaz in order that they would abstain from robbing the pilgrims. In 1923 the second caravan from Mecca to Medina with which the writer travelled was stopped at Bir Abbas alone for nine days; and the third caravan in the same year was stopped at the same place for more than thirty days, till rice got so scarce there that $1 had to be paid for a tea-cupful. In 1924, no caravan ever reached Medina as they

were stopped by the Bedouins at Rabigh and not allowed to proceed. These were the years when King Hussein, now dethroned, was Ruler of the Hejaz; and rumour has it that Hussein could not or would not pay the promised amounts of subsidies to the different Bedouin tribes; hence the trouble. Under the Turkish regime, although these annual subsidies were regularly paid, no caravan ever attempted to go to Medina without a strong escort of Turkish soldiers. And even if the caravan was not stopped on the way, there was always theft and sometimes murder committed by the camel-drivers during the journey.

At last, after a weary journey rendered the more unbearable by the burning heat of the sun in the desert, Medina is reached A turn in the road on a small hill suddenly brings the pilgrim in view of the town about a mile away. What his sensations are at the sight of this holy city, the burial-place of the Prophet, and the object of his uncomfortable and perilous wanderings for the last two or three weeks, is better left to be experienced than described. The writer remembers tears of delight, starting to his eyes from a sense of being brought back as it were from death to life and an indescribable lump in the throat rendering speech difficult. He was constrained to draw his hands across his eyes to suppress the tears which, he was afraid, would make him look a fool in the eyes of his fellow-travellers. But, after all, what shame is there to shed these tears when fellow-travellers are also experiencing the same feelings: indeed, some of them were sobbing aloud, pitied even by the unpitying Bedouin camel-drivers.

The town of Medina is a little smaller than Mecca. It has a permanent population of about twenty thousand. It is situated in a valley, though the hills are somewhat far away so that the whole town is on flat land. The houses are in type and pattern exactly similar to those in Mecca and Jeddah; but the streets are not dusty and dirty because there is no sand on the ground but clayey earth. One can see date palms growing here in profusion and in some places even bananas and sugar canes. In summer it is cooler than Mecca and the water here is about the best to be found in all this wide world. The inhabitants are more genteel and better-mannered than anywhere else in the Hejaz. Even the wild Bedouin camel-drivers, ill-mannered, overbearing and short-tempered during the journey, are suddenly transformed on their entry to this town and assume a meek attitude, more gentle than the proverbial lamb. There are no loud shoutings from coffee shopkeepers, sherbet-sellers and even money-changers as one finds in the streets of Mecca. All is quiet and orderly suggesting the peace and tranquility so greatly desirable to great thinkers for their meditations. "Medina is as quiet and tranquil as the Prophet would have it in his lifetime" whispers everyone.

The Medina mosque is smaller by far than the one in Mecca. It is situated to the south of the town with its *kiblat* (direction for prayers) facing towards Mecca. In shape it is a rectangle with its length, 200 feet, running from North to South and its breadth, 150 feet, from East to West. It is floored and roofed on three sides, leaving a space on the western side, unroofed and unfloored, where can be seen a well and some date-palm trees. Opposite this "garden" is the place reserved for ladies to say their prayers The large space to the southward is where the men perform their devotions. The Prophet's tomb is situated near the south-eastern corner of the mosque, inside. There is a large *Qubbah* or cupola over the tomb and within it are also enclosed the tombs of Abu Bakar and Omar, the first two Caliphs after the Prophet as well as the tomb of Fatimah, the Prophet's favourite daughter. The four tombs can only be seen from the outside through openings in the walls of the Qubbah and are kept under lock and key by eunuchs employed there as special guards. There are five minarets to this mosque and the southern wall inside is inscribed with the full text of the Koran in gold letterings, whilst the floor is covered with some of the richest carpets in the world. There is a pulpit where the *Khatib* or preacher delivers his Friday and Eid sermons; and close to the pulpit, the pilgrim is shewn a few feet of ground said to be holy, as the story goes to say that the Prophet once said that particular piece of ground would be raised to Heaven along with all good folks on the Last Day. The pilgrim is advised to say a short prayer thereon, so that the piece of ground will take him up to Heaven when it is raised up by the Almighty. Whether this is true or not, for the present, it suffices that the imparter of such a valuable "religious secret" is invariably helped on to his heaven in this world with *bakshish* from the unquestioning pilgrim. No wonder in the eyes of the Arabs all Malays and Javanese, who are grouped together under the nomenclature of *Jawa* in this country are "cows"!

Outside the town southwards, about a hundred yards from the mosque-wall there is a cemetery called *Baki.* This is also visited by the pilgrim, as it contains many tombs and graves of saints and martyrs who were respected and honoured by the Prophet. About two miles away from the town there is another cemetery where the martyrs of the famous Battle of Uhud, one of the greatest victories of the Prophet, were buried, among whom was Hamzah, an uncle of the Prophet, a great warrior and one of the Prophet's generals. This cemetery is at the foot of Jabal Uhud. All these the pilgrim is shewn by his guide; and he stays on in Medina only until he has attended one Friday service, after which he is told to make preparations to go back to Mecca. Any spare money that the pilgrim has goes to buy Medina dates which are said to be the best in the world.

The pilgrim returns to Mecca by the same way that he came, undergoing the same trouble and difficulties the only difference being that the pilgrim is now in *ihram*.

The pilgrim who is unable to visit Medina may, with equal merit, visit Ta-if, as the Prophet is reported to have said: "The visit to the tomb of my uncle Abbas at Ta-if is equally meritorious with the visit to me (or my tomb at Medina)". The advantage in this alternative lies in the fact that it takes only three nights to reach Ta-if from Mecca as against twelve to reach Medina. There is another attraction that Ta-if offers: it is cooler there than anywhere in the Hejaz. In fact, it is the hill-station for Mecca, very much in the same way that Simla is to India. It is to Ta-if that the dignitaries and rich merchants of Mecca go during the hot summer months, when free from all that the pilgrimage season entails. Besides being a hill-station, Ta-if is also the vegetable garden for Mecca: tomatoes, gourds, pumpkins, carrots, spinach, onions are grown here for consumption in Mecca. Perhaps it is wrong to call Ta-if a town, for there are fewer shop-houses there than "summer-houses," which are built in gardens or rather vineyards. The compounds of these summer-houses are full of grapevine, intermingled with pomegranate trees and flowering shrubs. No need to try and conjure up a pen-picture of these gardens when the grapes are ripe and the flowers in full blossom, as any one can appreciate what it is to be in such gardens after seeing rocks and sands almost everywhere in the country. In the garden known as *kĕbun raja*, the coolness is enhanced by a stream of fresh water flowing right through the middle. And again, as Ta-if is 4400 feet above sea-level, one can see the country from it for miles around, giving one a sense of freedom above the many crowded hill-ranges. The scenery on all sides from this high elevation is glorious.

Such is Ta-if in its principal features. But our Malay pilgrim is not concerned with its beauties, or its invigorating climate: he is here for the pilgrimage alone. If the grapes and other fruits are in season it is merely a happy coincidence in the Scheme of things that he is able to enjoy those fruits. His philosophy lies in the happy medium between the two injunctions:—(1) Be grateful (*shukur*) to Allah when He gives you out of His mercy and beneficence His bounties that you can enjoy. (2) Be patient (*sabar*) when He makes misfortune overtake you. What the pilgrim is chiefly concerned with at Ta-if is the tomb of Abbas, the uncle of the Prophet. And he also finds in the Ta-if mosque the tombs of two of the Prophet's sons, Kassim and Tahir who died young. He is shewn on a rock the spot on which the Prophet prayed for the assistance of Allah when the people of Ta-if drove him from there in the early days of his ministry. At another place on another rock, he is told, the Prophet took his rest after preaching for a long time to the then unbelieving inhabitants of Ta-if; and there is

still to be seen the impress supposed to have been made by the Prophet's arm as it was placed on the rock to support his body while lying down. All these and such similar spots in other parts of the country, valuable only is true from a historical view-point, are venerated by the ignorant pilgrim to an extent verging on fetichism, although the Prophet took great care to warn his followers against such practices.

About the beginning of Zulhijjah, there is great excitement in Mecca on account of the arrival of the *Mehmal* which, before the expulsion of the Turks from the Hejaz, were two in number: one from Egypt, the other from Syria (Sham). To the Malay pilgrim, the Mehmal from Egypt is known as *Shaqduf Fatimah*, while the one from Syria as *Shaqduf Nabi*. By an arrangement made some time in the early history of Islam, Egypt was to send annually to Mecca what is known as the "Holy Carpet"—the black silk covering for the Kaabah, whilst Syria was to send medicine which would be required by the pilgrim during the season As time rolled on, many rich Muslims both in Egypt and in Syria bequeathed various "wakafs" in the form of money, corn and the like, to be sent to Mecca for the poor; and the executors of these wills took the opportunity annually to send these "wakafs" along with the Mehmal. Also, at a time when travelling between these countries was not yet facilitated by steam as at present, pilgrims for the sake of safety, accompanied their respective Mehmal. usually under the charge of an *Amiri'l-Hajj*, or Pilgrimage Officer; so that the whole procession became quite imposing. As it is known at present, the Mehmal is always heralded upon its entry to Mecca by music and singing and received equally joyously by the inhabitants of that Holy City. Even when all the gifts and "wakafs" have been received by those who are to receive them, the Mehmal or conveyance itself is taken round in procession "with fife and drum" on holy days of the "Haj" followed by all the soldiery of the Hejaz with their bands as well. After the Turks had left the country, Syria for some reason or other no longer sent her Mehmal: and in 1923 Egypt took upon herself the burden of sending the necessary medicines, but unfortunately King Hussein, then Ruler of the Hejaz, refused Egypt's gift and in reply Egypt brought back the Holy Carpet. At present Egypt is sending both the Holy Carpet and the medicines to Mecca.

The performance of the actual "Haj" after which only the pilgrim may assume the title of *Haji*, is begun by an assembly or "wuquf" at Arafat on the 9th of Zulhijjah; but pilgrims as a rule start going there even as early as the 5th of Zulhijjah. Arafat is a wide plain by the foot of a *jabal* or mount of that name; and the "wuquf" means merely to be at the place. Of course, some prayyers are repeated while the pilgrim is there; but the two great secret of Arafat are:—(1) it is the place where Father Adam and Mother Eve first met after their fall from Eden; (2) it is the place where

all humanity will assemble on the Day of Resurrection; in other words, it is the *Padang Yaum'il Mahshar* on the Last Day. Whether these beliefs are authenticated by the Word of God in the Koran and by the *Hadith* or Sayings of the Prophet, the pilgrim is not. during any time of his sojourn, enlightened: he is simply told that they are "religious secrets," which is quite contrary to the teachings of the Prophet who declares that there is no secret at all in Islam. While on this subject of "religious secrets," the writer would like to record the other secrets which the average pilgrim is told by his Shaikh and these are:—(1) that Adam lies buried somewhere under the Kaabah; (2) that the door of Heaven lies exactly above the door of the Kaabah, so that pilgrims are warned when entering the Kaabah not to look upward for fear they would see the *houris* there and be so enamoured of their beauty that they would go mad ever after. I would mention, however, that it is an undoubted truth that none of the pigeons (Fatimah's pets) which swarm everywhere in the Mecca mosque, are ever seen to fly across right above the Kaabah, for fear, it is said, of this unseen Heavenly Gateway that exists between the Kaabah and Heaven.

Let us return to Arafat. It is here that all the pilgrims assemble, waiting for the eventful 9th of Zulhijjah. They are all in *ihram* which is donned on leaving Mecca, and they live here in tents which now can be seen in thousands, each with its own particular flag recognised only by members of its party belonging to the different Shaikhs. The pilgrim is no longer bothered about cooking his own food here as elsewhere, because custom rules that the Shaikhs have to feed the pilgrims at Arafat as well as at Mina, another place where the pilgrims have to remain for two or three days. So, the pilgrim is free to devote all his time to the necessary devotions and he therefore repeats his prayers almost incessantly. At three o'clock in the afternoon, a gun is fired as a signal that the Khalifa or Successor of the Prophet is about to deliver his Haj sermon from the sacred mount of Jabal Arafat, as did the Prophet himself in his lifetime. This is the most important feature in the whole ceremony for the performance of the Haj, as the *khutbah* or sermon was intended by the Founder of Islam to be a review of the Muslims' social, moral and political progress during the year by their Spiritual Leader, the Prophet himself or the Khalifas after him; but the pity of it is, as it is done today, more than 90% of the pilgrims do not hear and do not know what is said in the sermon, the end of which is signalised to them by the letting off of some fireworks. After sunset, the pilgrims will begin to move back to a place called Muzdalifah where they stay for the night. Before he leaves Muzdalifah, the pilgrim has to collect some small stones for the *mĕlempar* at Mina which is reached generally on the morning of the 10th Zulhijjah, At this place there are three stone-pillars, a little bigger than our milestones put up about 300 yards distant from one

another, and the pilgrim is required to throw seven stones, one at a time, at the three stone pillars one after another, beginning from the one farthest from Mecca and finishing with the one nearest to it. As soon as this is done, the *ihram* can be discarded and ordinary clothes put on. This day being the 10th of Zulhijjah, the festival of *Hari Raya Haji* so the pilgrims don their best clothes and the Shaikhs are busy "christening" the pilgrims one by one by tying the *sĕrban* round each one's head and patting him on the shoulder whilst calling each of them "Haji So-and-so." This ceremony is necessary only in that it brings $1 to the Shaikh for each "christening": and the simple pilgrim is pleased at being given an Arabic-sounding name instead of his old one which is, more often than not, merely the name of some vegetable or the like, such as *Kundor, Labu, Bulat*, etc., etc. Here it should be recorded that Arafat is about sixteen miles from Mecca, Muzdalifah about eight miles and Mina about four.

It has been said above that the pilgrim has to stay at Mina for two or three days. This is because he has to throw stones at the three stone-pillars not only on the 10th of Zulhijjah, but also on the two succeeding days, after which only he can return to Mecca. The idea of throwing stones is that it is in imitation of Ishmael who was tempted by, and threw stones at, Satan at those three places when he was accompanying his father Abraham to be sacrificed to God. The story says that Abraham had been commanded by the Lord to sacrifice his only beloved son for His sake; and though he himself had no compunction "to cut the throat" (*sĕmbĕleh*) of his son in obedience to the command of the Almighty, yet he entertained some doubt as to whether the son himself would be willing to be sacrificed. Great was the joy of Abraham when he found that his son was not only submissive to the Will of Allah but also immune to the temptations of Satan. And the joy was doubly great when after having killed his son, as he supposed, lo! it was found that a goat had been killed instead. God in His great mercy had put the animal in place of the son. And so, to this day a Muslim will sacrifice a goat to signify his submission to the Will of Allah, which submission represents the kernel of the Muslim faith. The sacrifice is done on the 10th of Zulhijjah at the foot of a hill called Jabal Kurban in Mina. Thousands of these goats are killed on that day, and as goat-flesh is not considered very wholesome in Arabia as food, the carcases of these animals are almost all thrown away, or rather dumped into a large hole and left there to be disposed of by the vultures as they please. In Mina also the pilgrim is shown the hill called Jabal Kufiah.....*kufiah*, or *kopiah* as it is corrupted in Malay, means a cap. It is said that Prophet Muhammad was once hiding in the cave at the foot of the hill; and when he stood up to go elsewhere, he hit the roof of the cave with his head

not only breaking his head but denting the stone-roof of the cave to the size of the head.

During the pilgrim's stay at Mina, apart from the performance of religious rites and devotions, the place is further enlivened every afternoon by a long procession of Bedouin Chiefs on camels, high dignitaries of State on horses with the King of the Yejar in the centre; the Mehmal from Egypt and from Syria and the soldiery on foot, all marching to the martial music from the Band of the State Army, as well as from the Band of the Mehmal. Even the Bedouin chiefs have their own Band playing music which resembles very much in tune a Scottish bagpipe. The cavalry give their display of horsemanship in front of the King's Mina palace, much to the admiration of the on-lookers. The Arabian horse is renowned all over the world, and its Arab rider does not lack reputation as a horseman. In the evening, about eight o'clock, there is a display of fireworks which lasts to about midnight.

On the third day, the 12th of Zulhijjah, after the throwing of stones at the supposed Satan as narrated above, the pilgrim returns to Mecca, there to perform again the *tawaf*, *sa'i* and *bĕrchukur* as before, to complete the requirements of the "Haj. The Prophet is reported to have said: "The pilgrims after the performance of the Haj are as free from sins as new-born babes." Commentators explain the meaning of this Saying thus: "The pilgrims, for the performance of the Haj, are pardoned all their sins in the past up to that time, *provided* they do not commit those sins again." Then again, according to some later expounders of the Faith, there are two kinds of Haj one is the *Haji Makbul*, the other *Haji Mardud;* the former is the one when the pilgrim's conduct is reformed for the better, while the latter is when he becomes worse in conduct than before.

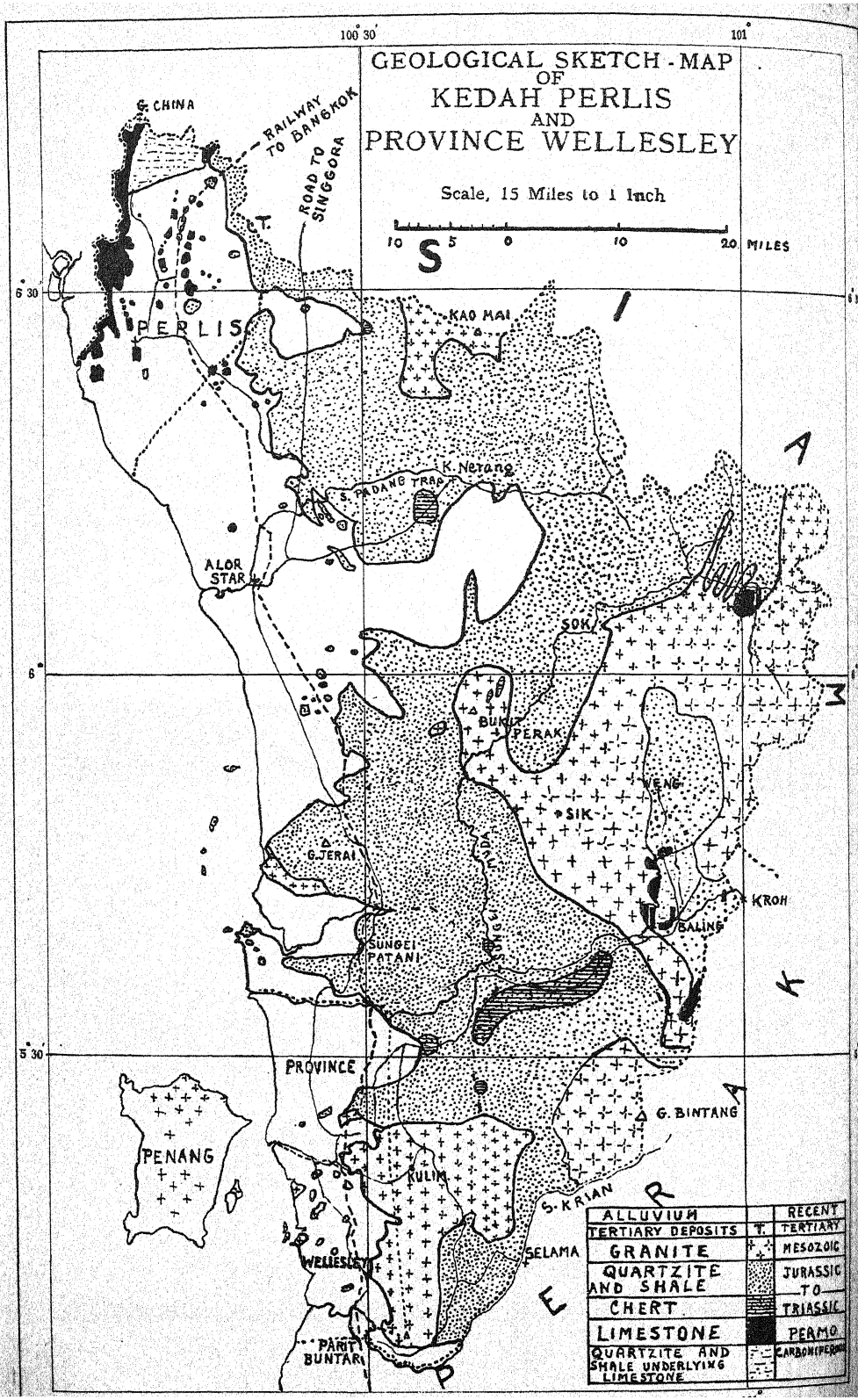
There is nothing else for the pilgrim to do now but to prepare for the journey home. He must needs buy the *sĕrban*, and *jubbah* for himself to distinguish him on high days from those who are not *Haji* in his own country, and possibly he may want the rosary (*tasbih*) too and he must needs have some of the *zamzam* water as a present for his relatives and friends at home, and possibly he may bring them also the *batu akek, kayu sugi. chĕlak* and *akar bahar*, so much valued and appreciated by Malays.

After performing the *tawaf wida'*, the pilgrim at last says "Good-bye" to the Holy Land with a clear conscience, happy in the belief that he has served Allah in so far as His commandment in connection with the pilgrimage is concerned.

Upon arrival at his *kampong* or village at home he is greeted and welcomed as befits one who has just returned from a visit to the "House of Allah," the Great and Almighty Allah, the Creator, the Evolver and the Nourisher of all the worlds.

We have followed the pilgrim in his wanderings and learnt of the hardships he has to undergo; we have seen what he visits, what he does, what he prays for and why; and we have discovered what is taught him. Let us reflect and weigh what he thinks of it all.

There is the monetary side. He expends freely often the savings of a lifetime. He sacrifices all the conveniences that only Home can give, no matter how poor that home is. Perhaps he wrecks his constitution, with strange food and a stranger climate. In 1924, which was by no means a bad year as far as the health of pilgrims went, among Malay pilgrims registered at the British Consulate, Jeddah, 15% deaths were reported within six months. Yet every pilgrim will assure you, on his Faith, that he will gladly return to perform the pilgrimage again to endure the same troubles and privations if only he has got the means to do it. What is it that provides this strong incentive to sacrifice all worldly possessions, all home comforts and even life itself? The writer must admit his inability to explain beyond these few words:—"Only a Muslim, firm in the belief of Islam, shall understand."


GEOLOGICAL SKETCH-MAP
OF
KEDAH PERLIS
AND
PROVINCE WELLESLEY
Scale, 15 Miles to 1 Inch
10 5 0 10 20 MILES
100° 30'
101°
6° 30'
6°
5° 30'
G. CHINA
RAILWAY TO BANGKOK
ROAD TO SINGGORA
PERLIS
KAO MAI
K. Nerang
S. PADANG TRAP
ALOR STAR
SOK
BUKIT PERAK
WENG
SIK
G. JERAI
KROH
BALING
SUNGEI PATANI
PROVINCE
G. BINTANG
PENANG
KULIM
S. KRIAN
GELAMA
WELLESLEY
PANTI BUNTAR
MALAYA
ALLUVIUM
RECENT
TERTIARY DEPOSITS
T.
TERTIARY
GRANITE
MESOZOIC
QUARTZITE AND SHALE
JURASSIC TO TRIASSIC
CHERT
LIMESTONE
PERMO CARBONIFEROUS
QUARTZITE AND SHALE UNDERLYING LIMESTONE

# The Geology and Mining Industries of Kedah and Perlis.

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With a geological sketch map.

## INTRODUCTION.

This report describes the results of field work from January 1922 until January 1924. Most of it was completed by the end of May 1923. A considerable amount of information was collected by Mr. J. B. Scrivenor, Geologist, Federated Malay States, in previous years, and this has been incorporated.

An account, written by Mr. J. B. Scrivenor and the present writer, of the geology of the Langkawi Islands, and the prospects of mineral development, was published in October, 1923, in Volume I of the Malayan Branch, Royal Asiatic Society, with a coloured geological sketch-map, so this portion of Kedah territory has not been dealt with in the present report.

During 1925, Major W. A. D. Edwardes, M.C., Assistant Superintendent, Trigonometrical Surveys, who takes a keen interest in the geology of the country, gave great assistance in furnishing a more accurate idea of the geology of the Baling District.

It was hoped to publish a large scale geological map, printed in colours, but as this would have entailed considerable expense, the attached sketch-map must serve. The map used when doing the field work was the 1920, 3 miles to 1 inch production, but later a coloured geological sketch-map has been prepared, using the 1925 2 miles to 1 inch map as a basis, and the later information obtained by Major Edwardes and the Malay Collectors has been used to amplify and correct the original. This latest large scale coloured map can be examined at the Geologist's Office, Batu Gajah.

## PREVIOUS LITERATURE.

The following list comprises the most important publications dealing with the geology and mining of Kedah and Perlis.

1. **Jones, W. R., Dr.** "Tin and Tungsten Deposits: The economic significance of their relative temperatures of formation." Bulletin of the Institution of Mining and Metallurgy, No. 186, March, 1920. Vide Chapter VIII.

2. **Newton, R. B., I.S.O.** "On Marine Triassic Fossils from the Malayan Provinces of Kedah and Perak." Geological Magazine, Vol. LXII, No. 728, February 1925. pp. 76—85.

In this paper the late Mr. Newton describes fossils found at Kuala Nerang, and Kampong Kuala, in Kedah, and identifies them as marine organisms and similar to shell-remains previously found at Putus Semanggol, in Perak. He states that the late Professor T. R. Jones was wrong in describing the Perak fossils as *Estheriella*, a Crustacean which lived in estuarine or lacustrine conditions. The fossils from Perak and Kedah are marine Pelecypods and include species of *Halobia*. Their age is Middle Trias. Extracts from the paper are given in Chapter VI.

3. "On *Fusulina* and other organisms in a partially calcareous quartzite from near the Malayan-Siamese frontier." Annals and Magazine of Natural History, Ser. 9, Vol. XVII., pp. 49—64, January, 1926.

The late Mr. Newton describes fossils found near boundary stones 9 and 10 in the north of Perlis, occurring in beds of hard quartzite with calcareous cement, interstratified with shales. The most abundant organism belongs to the foraminiferous genus, *Fusulina*, whilst others include remains of corals (*Stenopora*), crinoidal stem fragments, polyzoa (*Fenestellidae*), and imperfect casts of pelecypod valves. The presence of true *Fusulina* is of chief importance, however, for stratigraphical results, because that genus is characteristic of the youngest Carboniferous deposits (Ouralian) as well as of beds of Permian age, thus forming a definite Palaeozoic horizon which is often referred to as Ouralian-Permian, or Permo = Carboniferous.

4. **Ridley, H. N.** "The Flora of Lower Siam." Journal of the Straits Branch Royal Asiatic Society. No. 59 August 1911, p. 30.

Mr. Ridley suggests on botanical evidence, that at no great distance of time the flat land of Kedah was under the sea, in which Gunong Jerai and Gunong Perak stood out as islands as Penang does at the present day, and that the present flora of Province Wellesley and Gunong Jerai came up from the south while the flora of the country from Bangtaphan to Alor Star came from Burmah southwards.

On page 43 Mr. Ridley mentions "sea bird Guano" in a large cave at Chuping. He is evidently referring to the deposits of phosphate which are described later in the chapter on limestone. It is certainly not guano now; it may have been formed by the interaction of guano with limestone.

5. "The natural History of Kedah Peak." Journal of the Federated Malay States Museums, Vol. VII, part II, December 1916, pp. 37 and 38.

Mr. Ridley says: "The flora of Kedah Peak bears a considerable resemblance to that of Mt. Ophir.....There can be little doubt that Mt. Ophir was at one time an island detached

from the mainland as Penang is to this day, and it seems highly probable that Kedah Peak may have been similarly isolated."

6. **Robinson, H. C.** and **C. Boden Kloss.** "The Natural History of Kedah Peak." Journal of the Federated Malay States Museums. Vol. VI, Part IV, February 1916, pp. 219—244.

The introduction describes Kedah Peak:—It is quite isolated, standing on a base that does not exceed 50 square miles, and is separated by low land not exceeding 50 feet in elevation from all other hills. Its slopes to the north and west are much steeper than those to the south and east, and vertical rock faces, many hundreds of feet in height, exist. Geologically the mountain appears to consist of sandstones and quartzites of varying degrees of hardness, traversed by veins of quartz, while in one or two places deposits of haematite are found. It is well watered, being cut into by three great valleys which have been utilised for a water supply to the neighbouring districts, and the cliffs are ornamented in several places by cascades which are very conspicuous after wet weather of any duration."

From an examination of the mammal fauna and the birds the authors infer "That Kedah Peak has never been connected either with the Trang mountains or those of the Main Range in such a manner as to permit the passage of the fauna of these two districts to it."

7. **Scrivenor, J. B.** "Geologist's Annual Report for the year 1910." Supplement to the "F.M.S. Government Gazette," May 12, 1911, Kuala Lumpur.

An investigation was made of a reported occurrence of coal near Kulim. It had been stated that the coal was found on, or near, Victoria Estate, but, on cleaning out the well, not a trace of coal was found in it. Pieces of coal with tin-slag were found in a heap of debris near by, so it is possible that secret smelting operations had been carried on, but it was not discovered where the coal had been brought from.

8. "Memorandum on the possibility of obtaining supplies of artesian water in the F.M.S." Kuala Lumpur 1911.

A bore for artesian water was put down near Alor Star. After 60 feet it passed from alluvium into quartzite and continued in that rock to 130 feet until the bore was stopped. No good supply of water was tapped. It is interesting to have the record of the shallowness of alluvium at Alor Star, but it is probable that the bore struck the top of an eminence arising from the floor under the Recent deposits. Probably the average depth of alluvium is much more than 60 feet.

9. "A sketch of the geological structure of the Malay Peninsula," Journal of the Straits Branch, Royal Asiatic Society, No. 59, August 1911, pp. 1—13.

Mr. Scrivenor corrects the error which had found its way into Suess's book "Das Antlitz Der Erde," that the Lakawn Range enters the Peninsula from Siam to form the main granite range.

10. "Geologist's Annual Report for the year 1911, Kuala Lumpur. An analysis of monazite from Kulim is given.

11. "Geological History of the Malay Peninsula." Quarterly Journal of the Geological Society, Vol. lxix, 1913, pp. 343—371.

The Kedah Singgora Range was said to be composed of quartzite and shale, and it was thought that none of its summits reached 1000 feet above sea level. Surveys made since 1913 show that some of the hills are higher than this, and a granite mass occupies the highest ground, in the middle of the quartzite and shale country.

A well preserved beach at the foot of Gunong Keriang, near Alor Star, is cited as evidence that the flat land, west of the Kedah Singgora Range, was not long ago under the sea.

12. "Geologist's Annual Report for the year 1913," Kuala Lumpur. In this report Mr. Scrivenor mentions his unpublished report on the Economic Geology of Perlis. Material from this is incorporated in the present work.

13. "Geologist's Annual Report for the year 1914," Kuala Lumpur. A description is given of rocks from Baling district.

14. "Geologist's Annual Report for the year 1919," Kuala Lumpur. A description is given of prospecting work done near the coal-bearing rocks on the Perlis-Siam boundary. An account of this is given in the present work.

The geology and minerals of Kedah Peak and the Langkawi Islands are described.

15. "Geologist's Annual Report for the year 1920," Kuala Lumpur. Details are given of the two bores sunk to 81 feet and 68 feet on the coal-bearing beds in Perlis.

16. "Geologist's Annual Report for the year 1921," Kuala Lumpur. Details of the 205 feet bore in the Perlis coal measures are given.

Mr. Scrivenor suggested that the phosphate of Perlis may be present as amorphous aluminium phosphate. Analyses made since then indicate that the phosphate is present as hydrated calcium phosphate.

This subject is dealt with in the chapter on limestone.

17. **Scrivenor, J. B.,** and **E. S. Willbourn.** "The Geology of the Langkawi Islands" with a geological sketch map. Malayan Branch Royal Asiatic Society No. 88 October 1923, pp. 338—347.

The geology of the Langkawi Islands is not dealt with in the present paper as the above account dealt with it completely enough.

18. **Valentyn's** Description of Malacca, translated by Mr. Muller, Government translator. Journal of the Straits Branch of the Royal Asiatic Society, No. 13, June 1884.

The author mentions a factory in "Quedah" with an Underfactor and a Settlement to barter tin, gold, and elephants for the Hon'ble Company, but owing to trouble the factory had to be closed down in 1656.

19. **Willbourn, E. S.** "Geologist's Annual report for the year 1922." This gives a *resumé* of results of the survey to the end of 1922, which are now given *in extenso*.

PHYSICAL FEATURES AND GENERAL GEOLOGICAL SKETCH.

The most accessible part of Kedah is the strip of flat ground which is crossed from south to north by the road and railway, and as the larger part of the State is not traversed by any important line of communication, a visitor passing through the country receives the impression that Kedah is very flat. He would quickly change his mind if he were to go on a journey of exploration in the little-known eastern half of the State. With the exception of the roads from Padang Serai to Baling, Weng, and Kroh, and from Alor Star to Kuala Nerang, he would have to rely on rivers and jungle paths. The country formed of sedimentary rocks is hilly, and where the quartzites and shales have been metamorphosed, and hardened, by igneous masses, their resistance to denudation has left high peaks, such as Gunong Jerai, and the hills south of Sintok. The most mountainous part, however, is in the granite country on the eastern side of Central Kedah which extends over the boundary into Siam.

**Sungei Muda.** The largest river in Kedah is Sungei Muda. It flows along the northern fringe of these mountains, fed by a number of tributaries which rise in the highlands between Gunong Kubang Badak and Bukit Bubus, and in the shale and quartzite country as far west as the Bukit Pakir Terbang Range. Near Jeneri the Muda Valley passes between Bukit Perak, a long high granite ridge, and the high granite hills on the east bank. Granite outcrops can be seen in the river over a short distance only, and from here to the sea the river pursues an even course along a gentle gradient, with very few rock exposures.

**Ulu Ketil.** The eastern central granite mass is, on the surface, almost divided into two by a tongue of sediments which starts north of Weng and runs in a southerly direction to Baling. This furrow in the surface of the granite has determined the position of the valley of Sungei Ulu Ketil. A road has recently been made from Baling to Weng, and it would be an easy matter to prolong it to beyond Tanjong Pari. The construction of a

further extension over the granite mountains to Sok would be more difficult. The granite country between Weng and Sik and to the north of this line is very rugged, but to the south, near Baling, the granite ridges are lower. The path from Charok Pelandok to Kuala Kupang follows approximately the line of contact of the granite with sediments.

**Limestone hill in Ulu Muda.** On the map a limestone hill, Gunong Labuah, is marked in the headwaters of Sungei Muda, near the Siamese boundary, but its position is not accurately known.

**Baling Hill.** Baling limestone hill is usually viewed from the Baling road, from which it seems to be a solid mass of limestone several miles across. From the north, or better still, from the summit of the hill itself, it is seen to be a natural amphitheatre like the *wangs* of Perlis, horse-shoe shaped, with an opening 2 miles across at its northern side. There is another much smaller opening at the south-west corner, near Pulai, which is known as *pintu wang*. The limestone cliffs are very imposing on the inner walls of the amphitheatre, and, in comparison, the low rolling ground inside appears to be quite flat. Actually there are hills up to about fifty feet in height, and it is interesting to note that they are built of sandstone and shale.

**View from Baling Hill.** The top of Baling Hill is a good spot for viewing the whole of the southern part of Kedah; Gunong Jerai (Kedah Peak), Bukit Mertajam, and Penang Island can all be easily picked out, as well as a number of less conspicuous hills. The rising ground to the east of Baling is the beginning of a broad expanse of plateau land which extends into Upper Perak and Siam.

**Limestone ridge near Perak border, south-east of Baling.** The presence of this hill was reported by Major W.A.D. Edwardes, and Malay Collectors were sent to visit it in December, 1925. They found a high limestone ridge, built up, at any rate in part, of coarsely crystalline marble. The country on its east side is granite.

**Bintang.** The granite range, which starts from the Dindings and passes to the north through Perak, ends abruptly after entering Kedah territory. Gunong Bintang, 6103 feet, on the Kedah Perak boundary is much higher than any other peak in Kedah. Gunong Kangar, 4760 feet, is a granite peak not far from Bintang. The country in Ulu S. Kuang, near the boundary, has not been visited, but a view from a hillock of sandstone about five miles upstream from Kuala Kupang showed that the boundary lies on an expanse of flat land, in all probability an area of sediments separating the Bintang granite from the southern prolongation of the Baling granite.

**Near Mahang.** The granite which occupies the Kulim District, extending to Gunong Bongsu, is separated on the surface from the Bintang granite by a north and south belt of sediments, forming an area of flat or rolling country between the two mountain ranges. There are small deserted mines in the flat country to the north of Mahang, but, with the exception of a *lampan* near Karangan, the only miners in the district in 1923 were tin-stealers.

**The Kulim granite mass.** Parts of the northern margin of the Kulim, Bongsu, Relau, Panchor granite are mineralised, but mining operations here are on a very small scale. There were mines near Kulim, now abandoned, and a mine is being worked a few miles from Karangan. There are also deserted *lampans* in the same district. On the whole it is an easy matter to map the boundary of this granite, because, as a rule, the sediments do not form such bold hill ranges as does the granite.

**Sediments in South Kedah.** In the quadrangle between the Kulim granite the Bintang granite, the Baling granite, Gunong Jerai, and the coastal plain of alluvium, there is an expanse of hilly land built up of quartzite, sandstone, shale and chert. The sediments have a general north and south strike, and, in the case of more thinly bedded rocks, such as the chert, the dips are nearly vertical owing to a succession of sharp folds. The north and south strike is typical of all the sediments in Kedah, and local exceptions can be explained by the presence of granite intrusions. On the west of this quadrangle, and south of Gunong Jerai, are shales with no sandy beds; all exposures show a massively bedded red shale. The red colour is due to weathering, and the unaltered beds are black in colour. The best exposures are on Bukit Sungei Pasir, and on the isolated hills near Kuala Merbok. It would seem that the four islands Bidan, Telor, Tukun Terendak, and Songsong, are built up of the same series, with the difference that some limestone is found in Bidan, and there is calcareous grit in Tukun Terendak.

**Red Shale. Volcanic Tuff.** Although there are good exposures of the red shale in the hills near Kuala Merbok, yet no fossils have yet been found in them, and it is not possible to say definitely whether the beds are younger or older than the quartzite of Kedah Peak and the chert, shale, and quartzite, of the Baling road, but the presence of limestone on Pulau Bidan makes it probable that the red shales are passage beds between the limestone series, developed in Baling, and the overlying arenaceous beds. The eastern boundary of the area occupied by the red shales is indicated by a dotted line on the geological sketch map. There is a shortage of good road metal up to the 36th mile on the Baling road, because of the absence of unweathered quartzite, and at present the only supplies are drawn from

quarries of weathered chert. At the 36th mile there is an exposure of hard volcanic tuff which gives a satisfactory road metal.

**Gunong Jerai.** Gunong Jerai, 3987 feet, is a most imposing pile, seen from many points of view from land and sea. It is built up of quartzite which has been made highly resistant to weathering by the hardening metamorphic action of granite intrusions. Probably the core of the mountain is a mass of granite, for some of the foot-hills on the south and south-west side are granite or pegmatite, and intrusions of sheared granite-porphyry are exposed on the mountain, some quite near the summit. There are very precipitous cliffs, one, on the south side near the top, being particularly conspicuous. It is characteristic of quartzite hills that they have steeper slopes than hills of granite, and the fact can be used sometimes to map the granite contact in difficult country. For instance, Bukit Kepala Gajah, which is one of the hills attendant on Jerai, can fairly surely be mapped as quartzite on account of its steep contours. The granite intrusion near Gunong Jerai is tin-bearing, and tin-mining has been carried on near Semiling for some time. Coarse-grained pegmatites were recently worked for mica near Tanjong Jaga. There are reports that gold was found in the mountain, but no confirmation of this has been obtained.

**Bandar Bahru.** The sedimentary rocks lying between the Kulim and the Bintang granite, exposed on the Bandar Bahru and Selama roads, are arenaceous, and similar lithologically to the Gunong Jerai quartzite and to the quartzite and shale exposed in the country to the east and north-east of Gunong Jerai. Although Pulau Kera is outside Kedah territory, yet it may be mentioned as belonging to the same series. It lies between the granite of Penang Island and the Kulim granite.

**Plains.** There is a small alluvial plain to the south of Gunong Jerai, from which various hills of red shale stand out like islands from the sea, and there is a much larger plain on the north side of the mountain. It extends into Perlis to within a few miles of the Siam border, and east of Alor Star a narrow deep bay of alluvium penetrates inland as far as Kampong Pinang. It is possible to draw a line from the sea eastwards through Alor Star, on perfectly flat country for more than half the breadth of the State at its widest part. A good deal has already been done towards irrigating the plain by means of canals, and there are very large areas still remaining to be developed.

**Sedimentary rocks in North Kedah.** Apart from this alluvial plain, a series of quartzites and shales occupies the greater part of northern Kedah, and as in South Kedah, the rocks are associated with radiolarian chert. They form part of the series, younger than the limestone, that is extensively developed throughout the Malay Peninsula and fortunately there is deci-

sive evidence to give the age of one horizon in Kedah. Fossils found in black shales interbedded with quartzites at Kuala Nerang, and near the Bukit Pakir Terbang conglomerate range, are similar to those found many years ago near Taiping in Perak, and they were stated by the late Mr. R. Bullen Newton, of the British Museum of Natural History, to be of Middle Triassic age. Conglomerates are commonly developed east of Kuala Nerang, as in the neighbourhood of the fossils found near Taiping, and the Bukit Pakir Terbang Range, which forms the State boundary to the east of Kampong Kuala, is built up solely of them. Parts of the range, on its western (Kedah) side, have vertical cliffs hundreds of feet in height, and it would be quite a feat of climbing to ascend to the Trigonometrical Survey beacon from this side. The slopes are much gentler in Siam. In 1922 a view from the summit of Bukit Perak, many miles away, showed that the three-peaked hill, Batu Tajam, marked as 1896 feet in height, to the south of Bukit Pakir Terbang, was once probably part of the same range, because its bold contours suggest that it too is made up of conglomerate. This was confirmed later by Major Edwardes, who went along the ridge including Batu Tajam and Bukit Sayong. The pebbles in the rock at Gintang Kerinai and Bukit Pakir Terbang are commonly two inches across, and boulders with a diameter of one foot are not uncommon.

**Metamorphosed Sedimentaries in North Kedah.** The quartzite and shale in the neighbourhood of Padang Pelandok and the Alor Star Catchment Area seem to be underlain at no great depth by granite, indicating that the granite intrusion exposed at Pintu Wang and on the boundary at Kao Mai has a much greater lateral extent a short distance underground than on the surface. This is seen by the wide-spread metamorphism of the shales and quartzites in the two districts above-mentioned. There is a very beautiful gorge in the Catchment Area in which the metamorphosed shale and quartzite are well displayed.

In the north-east corner of the State, to the east of Kao Mai, the boundary is quite low, and there are no striking features. Ginting Pahat, at boundary stone 34, is a V-shaped pass between two hills. It is about fifty yards long and fifty feet deep, and at the bottom of it is only two or three feet wide. It has been formed as a result of the natural erosive action of two streams which have worked backwards to meet at their headwaters, one the S. Tempat, flowing westwards into Kedah, the other, the S. Langetap, flowing into Siam. The walls of the valley are of red earth in which are embedded fragments of fine grained schist, which looks like metamorphosed sandstone. No granite is known to outcrop near here, but it probably underlies the sediments at a shallow depth.

**Kao Mai.** The watershed to the west of Ginting Pahat, which forms the boundary between Siam and Kedah, is all low, less than 1000 feet above sea level, until the granite slopes of Kao Mai, 2486 feet, are reached, near Kampong Seraya, and here the country is more mountainous. No tin deposits are known, though there are mines working on the same intrusion, near Padang Pelandok, in Ulu Badak, and at Pintu Wang, a few miles from Ban Sebapein. This is the intrusion that has caused the widespread metamorphism south of Padang Pelandok, and the effect on the topography has been to leave hills of altered sediments, over 2000 feet high, that have resisted denudation as stubbornly as granite.

**Prominent hills in the coastal plain.** Between these schists and the coastal plain, less strongly metamorphosed sedimentary rocks form an area of rolling country, bounded on the west by a number of rather prominent quartzite hills, whose slopes disappear under alluvium. These hills, Bukit Talipong, 1271 feet, Bukit Tunjang, 987 feet, and further south, Bukit Tinggi, 438 feet, and Bukit Hijau, 484 feet, were in Recent times a natural barrier against the eastward creeping sea. The sea bottom was being covered by mud, sand, and silt, brought down by rivers from the hills, so that, when uplift took place, the new land that emerged was a flat plain. A number of islands and irregularities on the sea floor that had not been silted over are seen at the present day as isolated hills in the alluvial flat, and certain areas of low undulating country, such as that between Sungei Patani and Gurun, and in the north and east of Perlis, were swept by the sea, and probably denuded, to some extent, by the action of the waves.

**East boundary of Perlis.** There are no natural features forming the boundary between Kedah and Perlis. The watershed at the east boundary of Perlis and Siam is nowhere very high, Bukit Tinggi, 378 feet, being the highest point. Tertiary beds with interbedded coal seams are known to occur near Bukit Tinggi, but neither their lateral extent nor their thickness has yet been proved. They are known not to reach so far as Padang Besar in the north, and an outcrop of ancient quartzites and shales was noted by Mr. Scrivenor in the west, but it is quite possible that they extend to the south-east across the Changlun Singgora road. One weathered road-cutting gave the only evidence, and it was not possible to decide from this whether the rocks were of Tertiary age or more ancient. Owing to the gently undulating nature of the country along this watershed there are very few exposures of rock, and recourse must be had to boring before definite information can be obtained. Prospecting work carried out by the Railway Department, Federated Malay States, is described in a later chapter.

**North boundary of Perlis.** Gunong China, 2370 feet, in the north of Perlis is a granite mountain, bounded on the south by limestone, and on the east by quartzite, calcareous grits and shales, which underlie the limestone. At Bukit Mata Ayer, 1668 feet, limestone again appears. Fossils were found in the quartzite near Bukit Mata Ayer which prove the age of the beds to be Permo-Carboniferous. Probably the limestone is of the same period, though on a higher horizon.

**The Setul boundary Range.** The western boundary between Perlis and Setul is defined by a conspicuous limestone range. The northern half of it is continually being explored by prospectors, and caves containing alluvial tin-ore have been worked for many years. The granite of Gunong China seems to be the source of the tin-ore. The limestone range has been carved into wonderful shapes by weathering, and it is honey-combed by subterranean streams. The enterprising miner follows these passages for miles, sometimes walking erect through lofty caves, sometimes squeezing his body through the merest cracks, and he may be rewarded by finding a fortune in a single cave, or he may find nothing but bare floors and walls wherever he goes.

**The wangs of Perlis.** Hidden away amongst the limestone hills of this Setul boundary range are low-lying flat plains called *wangs*, surrounded on all sides by vertical cliffs. In the hills the gorges are dry, except in very wet weather, and the lack of water for bathing and drinking, with the very rough irregular nature of the country, make journeys very difficult indeed. But in the *wangs* matters are quite different. The country is flat and well-watered, and usually there are one or two Malay villages in them. Wang Tangga, near Kaki Bukit, was thought to have a floor of sandstone like the *wang* in Baling Hill, because fragments of shale and sandstone are common in some of its streams, but bores sunk by Mr. A. J. Kelman in 1925 proved bedrock in all cases to be limestone.

**Hills in the plain in North Kedah.** The greater part of Perlis is occupied by a flat alluvial plain which extends southwards through Kedah as far as Gunong Jerai. From it there rise numerous hills of ancient rocks, many of them limestone with vertical cliffs, others shale and quartzite with gentle slopes. Most of the quartzite and shale hills are included in two groups, one near the railway at Kobah, the other near Langgar and Kepala Batas. Gunong Keriang, 699 feet, a solitary limestone mass a few miles from Alor Star, is the most striking hill in Kedah when viewed from its east side, because its outline so closely resembles an elephant. There is a number of limestone hills near Kodiang, and the nearest to the railway station is being quarried away piece-meal for ballast and road-metal. Another of the hills has an outline like a crouching lion, similar

to Pulau Singha, an island of the Langkawi Group, again reminding the observer that in Recent times the hills were islands.

**Hills in the Perlis plain.** There is a chain of hills starting at Gunong Hutan Haji, a quartzite hill south of Kangar, continuing north as the limestone hills Bukit Lagi, Bukit Besi Hangat, and other small hills, and merging into the Setul boundary Limestone Range. Another chain begins on the west of Bukit Ketri railway station with a low hill of limestone, passing to the north as an interrupted range of isolated hills, the most southerly of which, Bukit Taming, is built up of quartzite underlying limestone. Further to the north as far as Bukit Chabang, the hills are limestone, and between Chabang and Bukit Mata Ayer the Permo-Carboniferous sandy rocks appear again. Another chain commences with a quartzite hill in the south, followed northwards by the limestone hills Chuping, Ketri, Jerneh, and others. These two ranges join together at the boundary in Bukit Mata Ayer. The railway runs northwards between the two chains, sometimes on the alluvial plain and sometimes on low hills of Permo-Carboniferous quartzite and shale which were not completely covered by alluvium, when all but the high hills were lying below the sea.

**Chuping and Jerneh.** Bukit Chuping is a very imposing limestone mass, and the thin wall of limestone known as Bukit Jerneh, 1070 feet, is even more striking, in its way, when viewed from the end, on account of its slender, apparently spine-like form. These two hills, like all the others, are honeycombed with underground passages and caves, some of them of great beauty. The floors of many of the caves are covered with earth rich in phosphate, which has been used for many years by the Malay peasants as manure for their rice fields.

## The Granite and Allied Rocks.

The granite in the various ranges in Kedah and Perlis is often like that in the other States of the Peninsula, in that the dominating type is a coarse-grained rock with large porphyritic crystals of felspar. There are modifications without porphyritic felspars, and of finer grained granites; the different occurrences will now be described.

**The Kulim-Gunong Bongsu granite.** In the Kulim district the granite is usually a coarse-grained porphyritic variety containing both muscovite and biotite, with frequent pegmatite veins rich in tourmaline, as seen at the reservoir on Bukit Besar, near Kulim, in the quarry at Bukit Jelutong, and in exposures along the Bandar Bahru road. Fluorite was noted on Bukit Besar, and in the Penanti quarry in Province Wellesley. The granite and associated vein rocks are known to contain cassiterite at various points near the northern fringe of the granite, and there is old mining land near the 11th mile on the Bandar

Bharu road. It is said that a large crystal of cassiterite was picked up in a granite quarry at the Bukit Serayah reservoir, in Province Wellesley. Wolfram occurs with the cassiterite in a mine near Karangan.

**Gunong Bintang granite.** More is known of the Perak part, but the little that is known of the portion that overlaps into Kedah shows no change from the character of the rock in the Selama district. It is a fairly coarse-grained granite with porphyritic felspars. A specimen from the top of Gunong Baubak, collected by Major Edwardes, is granite with porphyritic felspars and no hornblende. Unlike the Kulim granite, if one may judge the whole mass from the few specimens available, if contains little or no muscovite. Some hornblende granite is known in Perak between Ijok and Pantai Besar, but none is known in the northern part of the Bintang Range.

### The East-Central granite mass.

**Near Baling.** The granite exposed near the Kuala Ketil road between two and six miles from Baling is rich in biotite and it usually contains abundant hornblende and pyroxene. Large porphyritic crystals of felspar are conspicuous, and the white and black minerals are often arranged in separate bands, so that in some cases the rock can be termed gneiss. Accessory minerals are sphene and pyrite. Specimens were brought by Malay Collectors from Damar II, the granite hill which lies to the east of the limestone ridge on the Perak border, south-east of Baling. Judging from these specimens the mass contains no hornblende, but tourmaline is common in quartz veins. Aplite with tourmaline was collected from Bukit Sang in Perak territory, about half a mile north-east from Damar II and fine-grained granite occurs at the foot of the limestone ridge, on its west side.

Aplite is a common vein rock in the granite near Bukit Jong, the western limb of Baling limestone hill, and the valley alluvium, and the granite and schists near the contact contain tin-ore. At Bukit Ibu lodes in the granite contain tin and wolfram. A fairly coarse-grained quartz-felspar rock, which under the microscope is seen to have granophyric structure, is exposed a few yards from limestone at the northern end of Bukit Jong.

**Near Sik.** At Charok Pelandok, are outcrops of common biotite granite with porphyritic felspar crystals, and the same rock was seen east of Bukit Enggang, three miles from Sik, on the little used path to Jeneri. The granite on this side of Bukit Enggang is stanniferous, for their is an old lampan, Charok Keh, on the hill side, about two miles north-east from Sik, and the alluvium near the land held by the late Badak Coy. was worked for tin six or seven years ago, in a number of small mines situated on quartzite country, near the granite contact.

**Bukit Perak.** This mountain is built principally of ordinary porphyritic biotite granite, but there is also some fairly fine-grained two mica granite. Exposures of sandstone and schists are common on the lower north-eastern slopes. Granite is exposed over a distance of a few miles in Sungei Muda at Kampong Betong, Kampong Kolam and Jeneri.

**Between Sik, Weng, and Sok.** The common rock is biotite granite with porphyritic crystals of felspar and no muscovite.

**Sok to Ginting Reh.** There are no granite exposures on the track between Bukit Batu Tambun, north of Sok, and Jeram Nyek, and all the hills near have a characteristic cone-like shape indicating that they are quartzite. However, high granite mountains occupy all the country a few miles to the south. The rapids at Jeram Nyek (called Kampong Niyor on the map) are of aplite. There was tin mining in the bed of a tributary near here not many years ago. From this point going east up the main stream one passes alternately on to schistose sediments and granitic rocks. At Sungei Jawa, granite with porphyritic crystals of felspar occurs, while the last band of granitic rock immediately to the west of the Gunong Labuah limestone is aplite. After some miles passing over limestone, quartzites, and shales, the track comes to more mountainous country, and continues over porphyritic biotite granite to Boundary Stone 47, at Ginting Reh.

**East of Bandar.** Bukit Temalah, a mile east of Bandar (Bongor), is made up of granite that contains muscovite as well as biotite.

**Near Bukit Lata Pa' Palang.** Much of the granite near boundary stone 49B, east of Bukit Lata Pa' Palang is of a medium-grained non-porphyritic type, but fine-grained granite and aplite are also present. There is a large quartz vein standing up like a wall in Kedah territory near this point.

**Near Gunong Jerai (Kedah Peak).** The south-west part of this mountain is granite. Muscovite granite rich in tourmaline seems to be the common type with frequent veins of pegmatite. These pegmatites are quite coarse-grained containing large tourmaline crystals and "books" of muscovite flakes up to two inches across, which were recently mined at Tanjong Jaga. They are well exposed also in the foothills near Kampong Merbok. Tin mining is being carried on near Semiling. Veins of granite porphyry are common in the main central mass of the mountain. Most of the felspar has been altered to white mica and quartz, and the rock seems to be the same as the sheared granite-porphyry which makes up the greater part of Pulau Bunting. There is an ancient artificial pavement of dressed granitic blocks on the summit of Gunong Jerai.

**Near Ulu Badak, Padang Pelandok, and Kao Mai.** At the Siamese boundary (Stone No. 28) the common rock is biotite granite with porphyritic crystals of felspar, but a short distance to the south the felspar phenocrysts are rare, and up the Padang Pelandok pipe-line the typical rock is non-porphyritic, with muscovite and tourmaline. Similar non-porphyritic muscovite granite is exposed to the east of Padang Pelandok near Pintu Wang, but at the Pintu Wang mines most of the exposures show porphyritic granite with two micas. The mountain Kao Mai, 2486 feet, and its neighbourhood are built up of porphyritic biotite granite. Tin mining is going on in Ulu Badak, in Kedah, and also over the border, in Siam. Further south there are mines in schist country at Padang Pelandok, and here, near the west contact, and at Pintu Wang near the east contact, wolfram is a fairly common mineral. There is no mining near Kao Mai.

**Bukit China.** The mountain is built up of non-porphyritic biotite granite with occasional veins of tourmaline aplite. So far as is known, there has been no mining here, though prospecting was once carried out on the south-western slopes near the limestone contact, with a view to starting a hydraulic scheme. It is thought that this mass of granite must be the source of the alluvial tin that is mined in the limestone of the Setul Range. It is reported that granite is also present in Wang Mu, distant about two miles from Kaki Bukit.

THE QUARTZITES AND SHALES OLDER THAN THE LIMESTONE.

**Difficult to distinguish from the quartzites and shales overlying the limestone.** These are the most ancient rocks known *in situ* in the Peninsula, and up to the present they have not been recognised to the south of Kedah. Their only general difference from the Triassic quartzites and shales is that they often contain calcite, which has probably been deposited by water descending from the limestone. The effect of weathering is to remove the calcareous cement, and unless the strata can be seen actually underlying limestone, or unless the evidence of fossils is available, it is not possible to distinguish the two series.

**Comparison with Langkawi.** Quartzites and shales older than the limestone were first found in the Langkawi Islands by Mr. Scrivenor in 1920, and they are described in Journal 88 of the Malayan Branch of the Royal Asiatic Society. They are usually thinly bedded and in the places where a junction has been examined they pass conformably up into the limestone. The basal limestone on Langkawi is characterised by the presence of numerous nodules and lenses of siliceous material like flint, contained between bedding planes. Probably it was deposited by water coming from the quartzite below. No similar nodules

and sheets of siliceous meterial have been seen in the basal limestone of Kedah and Perlis.

**On the Perlis Siam boundary.** In Perlis the pre-limestone quartzites and shales occupy an area of about twenty square miles to the north of a line drawn from Kaki Bukit to Padang Besar, lying between the Setul limestone range and Bukit China granite on the west, and Bukit Mata Ayer limestone on the east. They form rolling country which was cleared by the Siamese many years ago to grow hill padi, and after a few crops abandoned. Consequently it is now a park-like expanse of semi-open country, covered with lalang except in the small stream-valleys which are shaded by jungle trees. The streams follow a general southerly course, and their valleys are situated where the more shaley strata come to the surface. The intervening hill ridges of quartzite are only a few hundred feeet in height.

**Thickness unknown.** The various exposures show that the strike of the strata is generally north and south, and the dip is usually to the east, varying considerably in amount. Probably the same strata are repeatedly brought to the surface by isoclinal folding, and it is not possible to form any close estimate of the thickness of the series, nor has any idea of the succession of component beds been gained, except that fossiliferous calcareous shales and quartzites occur within 1000 to 2000 feet of the base of the limestone.

**Fossils.** The different fossil localities at present known are all near boundary stones 9 and 10. Calcareous shales with obscure fossils are exposed in the banks of a stream at Alor Rumnia, near boundary stone 9. The other occurrences are in weathered quartzite near boundary stone 10, and the best is at Goa Lamah Maling, only about a quarter of a mile from the boundary.

The late Mr. R. Bullen Newton of the British Museum determined some of the fossils as related to Roemer's *Fusulina granum-avenae,* from the "Kohlenkalk" of Sumatra, and also to *F. Cylindrica* of Fischer de Waldheim from the Russian Carboniferous. The occurrence of these is strong evidence of Permo-Carboniferous age. *Doliolina* is present, indicating late Carboniferous or Permian age; he considers a rather obscure organism to resemble *Myriopora,* which is of abundant occurrence in Sumatran rocks of latest Carboniferous age. A fragmentary composite coral may most probably be referred, in a general manner at any rate, to the genus *chaetetes* of Fischer de Waldheim, originally described from the Carboniferous of Russia.

The occurrence of *Stenopora* in the Malay fauna is of great interest, since it is quite characteristic of the latest Carboniferous or Permian epoch. Fragments of *Fenestella* probably related to Schlotheim's *F. retiformis* occur. The true *F. retiformis* appears

to be restricted to the Permian formation of England and Germany, whereas some closely allied forms of *Fenestella* have long been known from the Permo-Carboniferous rocks of Australia. One pelecypod valve resembles *Schizodus*, which is a well-known characteristic shell of Permian times, and other fragmentary and doubtful pelecypod remains seem to be Pleurophorus, important as being characteristic of Permian rocks.

The beds may be taken to be of Upper Carboniferous or Permo-Carboniferous age, and the field evidence indicates that the massive white limestone of the Perlis hills overlies the fossiliferous quartzites and shales conformably.

An exposure showing the fossiliferous quartzites and shales passing into the limestone of the Bukit Mata Ayer Range has not yet been found. The most likely place for the passage beds to be exposed is at the south-west end of the limestone mass, north-west from Kampong Mata Ayer, where a hill of quartzite about 150 feet high abuts against a limestone cliff.

**Hills in the alluvium.** There are low hills of the Permo-Carboniferous sandstone a short distance to the north of Bukit Chabang limestone hill, but the hill itself stands in an alluvial plain, and no exposures of the passage beds occur here. The railway has been constructed to pass over more low hills of this sandstone, whose tops emerge a few feet above the alluvium, and limestone hills flank the railway on either side. Railway cuttings through the low hills show folded weathered quartzite and shale with a general dip to the east. Further north the quartzites and grits near Padang Besar are thought to be younger than the limestone, but the evidence is not conclusive and, as they are often calcareous, they also may belong to the older series.

**Bukit Taming.** Further south, at Bukit Taming, a short distance to the west of Bukit Ketri Railway Station, there is a fine cliff exposure showing quartzite passing conformably up into limestone. The dip is about 25° towards N. 70°E. over a distance of several hundreds of yards, and the folding here is very gentle. In an exposure of shale and sandstone near Bukit Ketri railway station the dip is vertical, and the strike has swung round through 45°. Only a few hundred feet of the Permo-Carboniferous arenaceous beds are exposed at Bukit Taming, and they seem to be all quartzite with no shale. No fossils have been found in them, but the basal limestone contains shell remains which are described in the next chapter.

**Wang Tangga.** Mr. A. J. Kelman had bores sunk in Wang Tangga, a hollow in the limestone hills west-north-west from Kaki Bukit, to prospect the alluvium for tin-ore, and he reports that all the bores which reached bedrock bottomed on limestone. However, low hills in the same *Wang*, further away from Kaki Bukit, are made up of quartzite and shale, and it is probable

that much of the Setul limestone Range is underlain by the Permo-Carboniferous arenaceous beds at no great depth below sea-level.

**The beds contain fresh felspar.** Twenty or thirty specimens of Permo-Carboniferous sandstones grits and shales from Perlis have been examined under the microscope, and the majority contain a noticeable amount of felspar in a fairly fresh condition. The grits and shales near Padang Besar, which are thought to be of Triassic age, also contain fresh felspar, and it is characteristic too of the arenaceous beds below and above the limestone in Langkawi. It is an indication that the material composing the rocks was derived from the denudation of igneous masses. The absence of felspar grains from the sandy beds further south may be due to the absence of exposures of igneous rocks from the land that was being denuded there, but it may also be explained by the more intense metamorphism that has generally affected the rocks in the south. The felspar grains would have first been changed.

**Baling.** This absence of felspar grains is noteworthy in the Permo-Carboniferous quartzite and shale at Baling. The beds are in the Ulu Ketil Valley, surrounded by granite, and underlain by granite at no great depth, and they show the effects of intense metamorphism. They are exposed inside the *Wang*, in low country surrounded by tall limestone cliffs almost 2000 feet high, and they also occur at the foot of the cliffs outside the *wang*, at the north-east end of Baling hill. It is difficult to distinguish which quartzites are older and which younger than the limestone, some distance away from the limestone cliffs, but, in mapping, the occurrence of conglomerate near Weng has been regarded as indicating the beginning of Triassic quartzite. No conglomerates of Permo-Carboniferous age have yet been found.

### The Limestone.

**Baling.** The limestone range near Baling is curved like a horseshoe, its axis enclosing a broad expanse of flat or slightly undulating ground. The highest peak, Gunong Pulai, is nearly 2000 feet in height, and Baling Hill, 1785 feet, is only slightly lower. Inside the ring the cliffs are taller than those on the outside and the northern face of Gunong Pulai is particularly striking. Besides a path from the Weng road through the broad northern opening, there is a track from Pulai, leading into the ring over a low limestone ridge between Gunong Pulai and Gunong Jong.

In the low-lying undulating country, forming the *wang* inside the ring, there are exposures of weathered quartzite and shale. These sandy beds form a slope which leads up to the foot of the Gunong Pulai limestone cliff, and as exposures of quartzite can

also be found on the east of Baling hill only about two yards from the foot of the limestone, it is clear that this quartzite and shale underlies the limestone.

There is no proof of any very intense folding in the limestone cliffs. As is usual, the bedding is much obscured by surface deposits of calcite, but a gentle anticlinal fold can be seen in the north face of Gunong Jong and very gentle dip can be distinguished in the east cliff of the same hill.

All limestone in the neighbourhood seems to be crystalline, and there is a large quarry at Baling from which a considerable amount of roadmetal is taken. A strip of country west of Gunong Jong, and the western fringe of the flat land as far north as Bandar is limestone, altered near the granite contact to form hard pyroxene schists which sometimes form fairly prominent hills.

One locality where these schists can be seen is near Bukit Sapi, part of the jungle-covered ridge lying to the west of Gunong Jong. The western end of the ridge, Bukit Charak Kelian Selut, is aplite, and at the east end the calcareous rocks have been metamorphosed with the formation of garnet, granular pyroxene, wollastonite, and amphibole. Another place, more convenient for examining the effect of metamorphism on limestone and calcareous shales is in a quarry near the 50½th mile, Weng road, where also there is a granite contact. Similar altered calcareous rocks form the bedrock in the tin mine at Bukit Pasir Puteh, near Pandar.

**Gunong Batu Puteh.** Major W. A. D. Edwardes in 1925 reported the presence of a limestone ridge near the Perak border, to the west of Gunong Damar 2, and two Malay Collectors brought back specimens of coarsely crystalline marble. They report steep white cliffs like those of Baling Hill. Major Edwardes also found outcrops of limestone at the 50¾th mile and at the 52¾th mile on the road between Baling and Kroh, but the majority of the numerous exposures show quartzite and shale.

**Pulau Bidan.** There is a cliff exposure of banded black and white limestone on the north-east side of this island with red and black shales near it. The island Pulau Tukun Terendak is calcareous grit.

**Gunong Labuah.** Little is known of this limestone hill. An outcrop about one mile south of Sungei Labuah was examined but the hill itself, which lies still further to the south, was not reached. It is said that natives extract saltpetre from earth on cave floors, and use it to make their gunpowder. The precipitous cliffs of Gunong Bayu, south of Gunong Labuah, that can be

seen from the summit of Bukit Setang, near Bandar, very much resemble the steep sides of the limestone hills of Kedah and Perlis, but actually Gunong Bayu is quartzite conglomerate.

**The Setul boundary limestone range.** In this range many *wangs* are known similar to that at Baling, in which a tract of low-lying country is surrounded by cliffs of limestone. The best known examples are Wang Tangga and Wang Kelian. It was thought that part of the floor of Wang Tangga was built up of sandstones and shales older than the limestone, like Baling Wang, but bores were put down by Mr. A. J. Kelman in 1925, and all bottomed on limestone. The tin deposits that are worked in these hills can be more conveniently dealt with later. The floor of Wang Kelian was examined by Mr. E. Graf, who gave the information that he put down a bore hole in clay with a 4-inch boring set, but he could only get down to 47 feet. There was no tin ore, and he gained no information about the bedrock.

**Bukit Mata Ayer and the thickness of the limestone.** This hill, 1668 feet, in the north of Perlis is the highest peak of a limestone mass extending from near Kampong Mata Ayer for about four miles into Siam, where it ends as a hill known to Malays as Bukit Anak Gajah, and to the Siamese as Kao Luk Jang. A view from near boundary stone 10 shows only three bare rock exposures on the western cliffs, and in all divisional planes can be seen from a distance of several miles dipping at about 25° towards the east. Probably these are planes of stratification. The general strike of the underlying quartzites and shales which make up the rolling country between here and the Setul limestone range is north and south and the dip is usually towards the east. At Bukit Taming some miles to the south, the limestone overlies the sandy beds quite conformably, and assuming that this is the case near Bukit Mata Ayer, and also that the calcareous grits and sandy shales near Padang Besar overlie the limestone conformably, the thickness of the limestone may be taken to the about 5000 feet.

**Dolomite.** A number of specimens from the hill contain a high percentage of magnesia, and some parts of the mass are certainly very dolomitic, but no detailed examination was made to see if there was any regularity in the occurrence of the magnesian limestone. Probably it occurs in irregular patches as at Batu Caves, Selangor.

**Bukit Taming.** Bukit Taming is the southern part of the Bukit Tungku Lembu Range, approximately on the same line of strike as Bukit Mata Ayer, and it lies about half a mile to the north of the approach road to Bukit Ketri railway station. The southern part of Bukit Taming is a quartzite hill which is joined to the limestone hill by a narrow quartzite ridge. On ascending the quartzite slopes which lie against the limestone cliffs, a very good exposure is seen near the top of the ridge, show-

ing the limestone overlying the quartzite conformably. The dip varies in amount from 25° to 30° and the direction is N 70°E or N 75°E. The uppermost beds of the sandy series consist of quartzite with calcareous cement, and no shales were seen in this exposure. The basal limestone differs from the basal limestone in Langkawi* in being devoid of lenses and nodules of siliceous material. None have been seen. A fairly rich fossil fauna is present in the basal limestone, and this is very interesting in view of the scarcity of recognisable fossils elsewhere. A flat spiral shell resembling *euomphalus* is the commonest type, but brachiopods resembling *rhynconella* are also quite common as well as a much larger shell of the *productus* type. The fossils from the quartzites near Goa Laman Maling were examined by the late Mr. R. Bullen Newton of the British Museum, and the presence of *Fusulina* and others indicates Permo-Carboniferous age. Probably the limestone fossils are of the same general period as these, though of slightly more recent date.

**Bukit Chuping.** Malay Collectors were sent to examine the limestone hills Chabang, Manek, Jerneh, Ketri, Chuping, Lagi, and the five small limestone hills that lie to the east of Jerneh and Ketri, in order to see if the underlying quartzites and shales are exposed in any of the cliffs, but they reported that nothing but limestone was to be seen. Some samples of stone from these hills are rich in dolomite, and others are practically non-dolomitic. The hill which lies to the south of Bukit Chuping is built up of quartzite younger than the limestone. There is a small exposure of limestone in the low lying ground on the southeast side. Some years ago an exposure of chert was found near here, but it can no longer be seen.

### Phosphate Deposits of North Kedah and Perlis.

**Mode of occurrence.** The general appearance of some of the hills of North Kedah and Perlis has already been described. There are caves in all of them, and in Bukit Chuping, Bukit Ketri and others, many of the caves contain rich deposits of phosphate which have been worked as manure for a long time. A deposit examined in a cave 200 feet up the side of Bukit Jerneh was being dug out in 1923, and let down a rope-way in bags to boats on a canal. The mouth of the cave had been cleared, leaving a vertical face of the cave earth about 15 feet high. Here it could be seen that the deposit was built up of parallel layers inclined downwards at about 20° towards the cave mouth, each layer being a few inches thick. They varied in colour from white, through yellow, to chocolate-coloured, and patches of greenish coloured material occurred. Material from caves in Bukit Kubang Tiga and Bukit Sinam contains only

* The Geology of the Langkawi Islands. Journal 88 of the Malayan Branch, Royal Asiatic Society, October 1923.

9 per cent to 12 per cent of phosphoric acid ($P_2O_5$), whereas eleven samples from another cave contained between 13.6 per cent and 28.3 per cent. The great bulk of the material is amorphous, but the samples which are richest in phosphate contain a mineral, occurring as honey yellow crystals.

**A rare mineral found in the cave earth.** Mr. J. C. Shenton, Chemist to the Geological Department, performed the following incomplete analysis on the mineral:—

| | |
|---|---|
| "Loss on ignition .. | .. 8.80 per cent. |
| $P_2O_5$ .. | .. 38.6 per cent. |
| Oxide of iron .. | .. 0.20 per cent. |
| Alumina .. | .. 0.92 per cent. |

The mineral also contains an appreciable amount of $So_3$ and the remainder is probably lime."

The specific gravity of the crystals is 2.863 and this together with their properties under the microscope, indicates that the mineral is probably monetite, $HCaPO_4$.

**Origin of phosphate deposits.** The origin of these phosphate deposits is not certainly known. They are not deposits of bat's guano, as has sometimes been stated, though it is quite likely that bat's guano has played a principal part in their formation. Bat's urine and moisture percolating through a layer of guano would leach out the soluble constituents, and the solution thus formed might interact with limestone, forming calcium phosphate. At first thought it is hard to believe that such large accumulations could be formed in this way, until one remembers that the caves have been inhabited by bats for unnumbered centuries, and that all of the guano would be changed in this way into material insoluble in water. The theory does not explain the regular layers of cave earth that were noted in the cave at Bukit Jerneh.

THE QUARTZITES AND SHALES YOUNGER THAN THE LIMESTONE.

**Malayan Laterite.** A large part of Kedah consists of rolling or hilly country built up of quartzite and shale, with chert developed in certain districts. The quartzites weather to sandstones, and black shales have sometimes been given a red colour in the process of weathering. The soil above them often contains concretions of ironstone, consisting of clay material bound together by haematite or limonite, which are locally known as laterite. In some countries this term is reserved for a residual deposit consisting essentially of a mixture of hydrated oxides of alumina and iron, but in the Malay Peninsula the term is used in a wider sense for these concretions of ironstone, which usually do not contain aluminium hydroxide. All kinds of rock, including granite and limestone, weather to form them,

and their form may disclose the nature of the bedrock where there are no outcrops. One can travel for many miles over rolling country composed of quartzite and shale without ever seeing an outcrop, but information about bedrock is afforded by fragments of laterite on the surface soil, perhaps thrown up from the hole of some burrowing animal, or brought up by the roots of an overturned tree.

**Thickness of Triassic and Jurassic arenaceous series is very large.** No estimate has yet been formed of the thickness of the series. Owing to folding each bed may outcrop at the surface a number of times, and exposures are too few to allow of the folds being mapped in detail; the dearth of fossils makes the identification of particular beds almost impossible. However, it is possible that, after the end of the period of limestone formation, arenaceous rocks were deposited continuously throughout the whole of the Triassic and perhaps also through part of the Jurassic period, and their thickness must run to tens of thousands of feet.

**South Kedah.** Road-cuttings afford information along the Bandar Bahru road, where there are various exposures of shales and sandstones. It can be seen that the rocks are older than the granite. Their strike is parallel with the granite contact, and also they are veined with quartz and kaolin stringers which are offshoots from the granite intrusion. There are similar exposures in road-cuttings along the Selama road, and there is a fine natural cliff of quartzite near the south-east corner of the area marked Somme Estate, on the 1925, 2 miles=1 inch map, which is being quarried for road-metal. The quartzite is tourmalinised, and this, together with the large amount of veining noticed in the Selama road rocks, indicates that there is granite at no great depth. The thickness of the bands of shale and quartzite varies a great deal. An exposure may show several beds of shale and quartzite in a thickness of a few inches, or there may be a considerable thickness of shales without quartzite, or of quartzite without shale.

**Near Baling.** Rocks similar to those of the Bandar Bahru district form the hilly ground east of Baling. Many of the exposures on the road up the pass to Kroh are of metamorphosed quartzite and shale, blue or blue-black in colour. A few are of limestone. Granite is not very far away, and the rocks have been metamorphosed by it. This can be seen particularly clearly on the old path from Becha Deredab, in Perak, to Baling which leads down S. Baling. From two miles down on the Kedah side, metamorphosed quartzite alternates with hornstone to the foot of the hill. Near Weng and to the north there are pebbles of conglomerate in the river, brought down from the hills near Kassim 2, Gunong Bayu, and Bukit Guah Harimau, and it is thought that here the limestone and its underlying shales and

quartzite end, and are replaced by younger quartzites and shales. Granite is not far away on the west and schistose rocks are common.

**Gunong Jerai.** Gunong Jerai (Kedah Peak) is a mass of quartzite that has been hardened and metamorphosed by granite and veins of granite-porphyry that have spread from it. The granite forms the foot hills on the south and south-west side of the mountain, and the veins probably extend right through the mass of quartzite, outcropping as bands on the northern side. The quartzite contains a considerable amount of muscovite and secondary tourmaline, and in some localities it contains deposits of magnetite and haematite of considerable size. This iron ore has, in all probability, been dissolved from the veins and re-deposited in the quartzite. There is little or no shale interbedded with the quartzite.

**Chert near Kuala Ketil road.** Chert is developed in the arenaceous series between Padang Serai and Baling. Small occurrences are known near Kelang Bahru, and in Sungei Muda at Lubok Gitan, a few miles north of Kuala Ketil, but the main development is in a belt roughly parallel to the road, between Bukit Tinggi, 17 miles from Kulim, and the 36th mile. An outcrop of volcanic tuff of Pahang Volcanic Series age marks the easterly limit of these outcrops. A hand-specimen of unweathered chert shows a compact hard stone, varying in colour from white to black, in which no grain can be made out with the exception of certain tiny dots the size of pin pricks. The stone is well bedded, and has joints in two planes at right angles to the bedding and to each other, so that it breaks into rectangular pieces. The distance between bedding planes is commonly one inch. Under the microscope the rock is seen to be made up of a very fine-grained aggregate of siliceous material, and the tiny dots are the casts of radiolaria, usually preserved in a rather imperfect fashion. Often sponge spicules are very common. A good place for examining chert in the field is the quarry at the 19½th mile, Kuala Ketil road. It is rare that chert is found perfectly fresh. Usually every joint plane is coated with a layer of iron staining, and often the hard chert is reduced to a soft clay, to which the radiolarian casts give the appearance of a weathered fine-grained sandstone. Along the Kuala Ketil road the chert is more weathered than usual, and very little of the material taken from the quarry at the 19½th mile is hard enough to be used as roadmetal. The beds are strongly folded, dipping steeply to the south-east.

**Chert in North Kedah and Perlis.** Chert is described also in North Kedah, near Kuala Nerang, at Jitra, and Sintok, and some years ago, Mr. J. B. Scrivenor found an exposure in Perlis near the quartzite hill at Chuping. In all cases quartzite is not far away, and some of the shales interbedded with the chert

contain a considerable amount of sandy material, so that it is evident that the chert must be regarded as a shallow-water deposit.

**Pahang Volcanic Series. A very small development in Kedah.** The outcrop of volcanic tuff which was alluded to above is interesting partly because of its position at the fringe of a chert area, and also because it is the only volcanic rock so far found in Kedah or Perlis with the possible exception of a calcareous grit on Pulau Tukun Terendak. A low hill of the rock is being quarried about ¾ mile from the 36th milestone on the road from Kuala Ketil to Baling. It is a black sandy rock containing concretions of calcite and small fragments of lava. There was no sign of bedding in the quarry face. The rock on Pulau Tukun Terendak is very similar but no fragments of lava could be found in it. The association of chert with volcanic rocks in Malaya has been described several times before*

**Ulu Muda.** The quartzite and shale in the Muda Valley above Lubok Gitan and in the headwaters upstream from the Bukit Perak granite, are not associated with chert. The hills have a characteristic conical or pyramidal shape, like Bukit Nerin and Bukit Gelembing near Kampong Ketaok, indicating that they are built up of quartzite with very little shale. Near the granite schists are formed, and some of them are rich in pyrites. At Sira Kechor, east of Bukit Jawa, there is a warm spring arising from a crack in hornblende schist to which herds of elephants, seladang, and other animals continually resort. The water is very clear except where it contains a thick woolly precipitate of iron hydroxide. It has medicinal virtue and this with the abnormal temperature, are perhaps due to the decomposition of pyrites. The country between Kampong Telian and Ginting Debu (boundary stone 43A) is all made up of quartzite and shale, strongly metamorphosed near the granite intrusion of Sungei Telian, and less so as the boundary is approached. The hills near the boundary are built up of quartzite with little shale.

**The Bukit Pakir Terbang Range of conglomerate.** Bukit Pakir Terbang Range from near Ginting Grak (boundary stone 39), through Ginting Kerinai and Pakir Terbang, to boundary stone 41, is built up of conglomerate. Major W. A. D. Edwardes reports that the range continues to the south through a peak 1894 feet high, and Gunong Sayong, 1700 feet, and that the whole of it is conglomerate. South of Bukit Sayong comes a belt of granite country about ten miles wide, and on the south

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The geology and mining industries of South Selangor and Negri Sembilan, Kuala Lumpur, 1922, pp. 52-54.

The geology of the Malay Peninsula and the surrounding countries Journal Straits Branch Royal Asiatic Society No. 86, November 1922, pp. 246, 247.

side of this are more hills of conglomerate, Bukit Guah Harimau, Gunong Bayu, and Kassim 2. To the south of Kassim 2, granite again cuts across the line of strike. It is evident that, before erosion removed the beds which once covered the granite, there was a band of conglomerate over 40 miles in length, with a strike of N. 15°W. by S. 15°E. At Bukit Pakir Terbang the pebbles vary up to more than 1 foot across, and they are commonly two inches across. The vast majority are of quartzite, some are of vein quartz, and occasionally of a dark fine-grained shaley rock, but no chert pebbles were found. On the Kedah sides the hills have very steep sides and there are some vertical cliffs. The vegetation is very scanty. A rank grass grows very sparsely, and there are no trees more than 20 feet high. Black sandy shales and quartzites are exposed in Sungei Bong, the stream which flows in a southerly direction, alongside Bukit Pakir Terbang Range, to meet Sungei Mong Gajah. Although no fossils were found in these shales, it is clear from their similar appearance that they are the same as the shales associated with quartzites about 1 mile west of the confluence of Sungei Bong with Sungei Mong Gajah, where an interesting collection of Middle Triassic fossils were made. Conglomerate is common a few hundred yards east of the fossiliferous shales. Between here and Kuala Nerang the quartzite and shale is of the usual type. In the whole of this district the beds are steeply inclined and the strike averages north and south.

**A critical examination of the fossils from Kuala Nerang and Kampong Kuala.** The late Mr. R. Bullen Newton published his report on the Kedah fossils in the Geological Magazine, Vol. LXII, pp. 76—85, in February, 1925, and the following passage gives extracts from it.

"The Kedah specimens mainly consist of a number of small Pelecypod valves which, on account of their association with Ammonoid remains and fragmentary stems probably belonging to a Crinoidal organism, suggest an undoubtedly marine origin. For this discovery we are indebted to Mr. E. S. Willbourn, B.A. F.G.S., the Assistant Geologist of the Federated Malay States, who obtained them from near Kuala Nerang (Field No. 5351), and Kampong Kuala (Field No. 5354), the latter locality being 13 miles east of the former, and 4 miles from the Siamese frontier, from black shales interbedded with black quartzite. Outcrops of quartzite-conglomerate (which is regarded as the basal number of the quartzite and shale series) occur a few hundred yards from Kampong Kuala."

"It is important to bear in mind the marine facies of this fauna, more especially in connexion with the Pelecypod valves, as very similar shell-remains were discovered, some years ago, by Mr. Scrivenor, in a non-calcareous dark shale of the same country (Putus Semanggol, Perak), which were described and

figured by the late Professor T. Rupert Jones, ("Note on a Triassic Estheriella from the Malay Peninsula"), as the carapace valves of a Phyllopodous Crustacean, under the appellation of *Estheriella radiata* (Salinas) var. *multilineata*, Jones the Salinas species having originally come from the Trias (Carnian) formation of the Island of Sicily. As is generally recognized, Phyllopod life is restricted to freshwater marshes, and to pools of brackish and sometimes stagnant waters, being totally unknown as frequenting the open sea. Therefore, when found in geological deposits, such Crustacean relics would imply that fresh-water or lacustrine conditions must have prevailed during the period of sedimentation."

"No other fossils had been found with those described by Rupert Jones, so that he was without confirmatory evidence as to their marine or freshwater origin, although he must have clearly favoured the latter view, because of acknowledging their phylopod characters and their supposed relationship to *Estheriella radiata* as figured by Salinas. He, moreover, overlooked some points of structure in the Malay fossils which were of Molluscan interest and unconnected with Crustacean morphology. Hence, he determined the valves as *Estheriella* of Weiss, a genus chiefly differing from the true *Estheria* by its possession of a radially striated ornamentation, and known only to have existed in Triassic times. A more critical examination of the valves in question has now been undertaken, so that with the aid of the actual type-material for comparison, kindly sent me by Mr. Scrivenor from his geological collections located in the Federated Malay States, it is hoped that a final pronouncement on the zoological position of these interesting fossils may be satisfactorily explained."

"Concerning the probable geological horizon of the fossils referred to in this paper, it can only be again emphasized that the principal Pelecypod valves indicate affinities with Marian's *Posidonomya moussoni*, a species characteristic of the Muschelkalk or Middle Trias, so it is thought that a similar age may be assigned to the shaley-clay deposits of Kedah and Perak which have yielded this small and interesting fauna. Certainly, the evidence seems to be in favour of the beds in question being of rather older Triassic age than the so-called "Myophorian Sandstone" from near Kuala Lipis, which was described some years ago."*

**Conglomerate near Kuala Nerang.** Middle Triassic fossils were found also in black shales interbedded with quartzites near Kuala Nerang, to the east of an area in which chert is strongly developed. Conglomerate occurs a short distance further east, as it does near the fossil occurrence twenty miles away, near

*R. B. Newton: Proc. Mal. Soc. London, 1900, vol. IV, p. 130, pl. XII.

Bukit Pakir Terbang. Many years ago the similar Middle Triassic fossils were found at Putus Semanggol in Perak, also associated with conglomerate, and it is evident from the three occurrences that the conglomerate must be of Middle Triassic age too. Conglomerates are found with the quartzites and shales in the neighbourhood of Durian Nok (or Durian Burong), as it is called locally) and also near Kampong Seraya. At Ginting Pahat a fine-grained schist is developed, and from its appearance it is probable that granite underlies the sediments at no great depth.

**Between Alor Star and Kuala Nerang.** The chert near Kuala Nerang does not differ from that near Kuala Ketil. It has been thrown into highly inclined or vertical folds, as is well seen in a number of exposures, but it is only occasionally that one finds signs of folding in the more massively-bedded quartzites and shales. The general strike in this district is north and south. The isolated hills between Langgar and Gajah Mati, are built of quartzite with very little shale, and they once formed a barrier against the advance of the sea to the east. Probably the hard quartzite barrier continued to the south, across what is now an alluvial plain to Bukit Guar Pepayang and beyond.

**Metamorphic rocks near Sintok and in Alor Star Catchment area.** The quartzite and shale in the Alor Star Catchment area has been strongly metamorphosed, and it is likely that there is a large mass of granite underlying the district. The quartzite contains muscovite and tourmaline, and the shales are altered to schists containing biotite, tourmaline, andalusite, and chiastolite. Similar metamorphic rocks make up the hilly country south of Sintok, and tourmaline is particularly common as a secondary mineral.

**Rocks near Sintok.** The chert near Sintok is like that elsewhere, but all the rocks here, quartzites and shales as well as chert, have a strike generally north-west by south-east. This departure from the usual north and south strike is probably due to the influence of the neighbouring granite mass. A search for fossils was made in the shales at the 18th mile from Kodiang, about one mile from Sintok, but without success. Bukit Talipong seems to be built up of quartzite, shale, and a hard black siltstone, judging from exposures on its southern flanks. The rocks here and at Bukit Tunjang, some miles to the south, have been subjected to a considerable amount of earth movement.

**Felspar grains in the sandstones of North Perlis.** The quartzite and shale of Perlis, as exposed at Gunong Hutan Haji, south of Kangar, and in the hill south of Bukit Chuping, presents the same characters as in Kedah. The strike is generally north and south and the dip is usually to the east, though it varies considerably in amount. The rocks which lie, on the east side of the limestone of Bukit Mata Ayer in the north, and which are

exposed along the railway for 3 miles from Padang Besar, all contain felspar grains. These can even be distinguished in the fine grained siltstone at Padang Besar, and it is rather an unexpected thing for such small grains of felspar to remain unaltered in a detrital rock in a tropical country. Owing to the low, gently undulating nature of the watershed forming the north-eastern boundary of Perlis, there are very few natural exposures, and the country here has not been examined except near the Tertiary deposit at Bukit Arang.

## Folding.

**Most information is afforded by the chert.** After this description of the quartzite, shale, and chert of Kedah and Perlis, it is convenient to discuss the structure of the country. The quartzites and shales which underlie the limestone can be studied only in a limited area in the north of Perlis, but they seem to have the structure described below as imprinted on the younger quartzites and shales. The limestone gives us very little information, because as a general rule, the bedding planes have been obscured by surface deposits of calcite, but the many exposures of well-bedded quartzite, shale, and, in particular, those of chert, are very instructive. The general strike is north and south, except near intrusions of granite, where the strike is usually parallel to the margin of the igneous mass. A number of chert exposures show isoclinal folds, which, no doubt, have also been imposed upon the quartzite and shale, but the amplitude of the folds in the more massively bedded quartzite is much greater, and there are no exposures large enough to permit one to see a complete fold. The folds are asymmetrical and highly inclined, both limbs of each fold dipping to the east.

**The folding is modified by the granite intrusions.** It is probable that the granite masses were intruded as a result of the powerful earth movements which caused the folding. Here and there, amongst the areas of high pressure occupied by the compressed sediments, there were spaces of lower pressure caused by the arching of overlying sediments, into which molten granitic magma welled from interior reservoirs. It has already been shown that the folding of the sediments has been modified by the intrusions of granite, that sediments near a granite mass usually have a strike parallel to its margin, and in this restricted sense it is clear that the intrusion of the granite has caused folding. Reasoning on a generally accepted theory, however, the main folding movements were not caused by the intrusion of the granite, but, on the other hand, they provided the opportunity for the granite's appearance.

## Tertiary Deposits.

In 1913 Mr. J. B. Scrivenor recommended prospecting for coal. Tertiary rocks are known near boundary stone 17F, 18, and 18A on the Singgora border, but very little can be said

about them as there are no exposures other than those in shallow pits. Mr. J. B. Scrivenor prepared a report for the Perlis Government in 1913 in which he stated that the most important portion of the State as far as mineral possibilities are concerned, is this neighbourhood, because, from the pits dug while he was in Perlis, it was clear that there is a patch of coal-bearing rocks very similar to those now being mined by the Malayan Collieries Company at Batu Arang, in Selangor. The seams exposed were small and valueless, but an analysis showed that the coal is similar in quality to that in Selangor. From the percentage of moisture it was classed as of Tertiary age, and probably of the Miocene period. Mr. Scrivenor recommended that a drill-hole be put down to pierce the bottom of the Tertiary rocks, in order to ascertain what coal seams they contain; to determine the lateral extent of the rocks it would be necessary to put down a number of shallow bores.

**History of the prospecting.** In 1919, boring was begun by a private firm in contract with the Federated Malay States Railways Department, and at the end of the year bores had passed through two seams of six inches each, and one seam of one foot in thickness. The rocks were described as clays with some hard stone, and a two-foot layer of limestone was reported from one bore. Operations were suspended temporarily in 1920, and the Railways Department then obtained an engineer to continue the work. Temporary roads were made from Bukit Ketri station to Bukit Arang, a distance of 7¼ miles, and a Keystone Drill was taken there. One bore was made to a depth of 205 feet and was then stopped on June 27th, owing to lack of casing, and because financial conditions were bad. Before the bore could have been continued, it would have had to be cased to the bottom on account of running sands, and the boring engineer believed that casing driven to that depth in this formation could not be recovered. The expenditure in 1921 amounted to $21,576.82. It is unfortunate that the bore was not finished, for there is still no definite information as to the possibilities of coal.

**Sections of the Tertiary beds.** The following sections were obtained in the three bores:—

**1st Bore.** Total depth 81 feet.

| Nature of rock. | Thickness. | Depth. |
|---|---|---|
| Clay .. .. | .. 5½ feet | 0 to 7 feet |
| Chocolate stone .. | .. 2 „ | 5½ „ 7½ „ |
| Coal .. | .. ½ „ | 7½ „ 8 „ |
| Black and green clay in alternate bands | .. 20½ „ | 8 „ 28½ „ |
| Coal .. | .. ½ „ | 28½ „ 29 „ |
| Clay alternating with stone | .. 11 „ | 29 „ 40 „ |
| Coal .. | .. 1 „ | 40 „ 41 „ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Clay | .. | .. 20 | „ | 41 | „ | 61 | „ |
| White hard stone | .. | .. 1 | „ | 61 | „ | 62 | „ |
| Clay | .. | .. 19 | „ | 62 | „ | 81 | „ |

**2nd Bore.** Total depth 68 feet.

| Nature of rock. | Thickness. | Depth. |
|---|---|---|
| Clay .. .. | .. 7 feet | 0 to 7 feet |
| Coal .. .. | .. ½ „ | 7 „ 7½ „ |
| Clay .. .. | .. 11½ „ | 7½ „ 19 „ |
| Coal .. .. | .. ½ „ | 19 „ 19½ „ |
| Clay .. .. | .. 2 „ | 19½ „ 21½ „ |
| Coal .. .. | .. ½ „ | 21½ „ 22 „ |
| Clay .. .. | .. 8 „ | 22 „ 30 „ |
| Shale .. .. | .. 2½ „ | 30 „ 32½ „ |
| Clay .. .. | .. 26½ „ | 32½ „ 59 „ |
| Limestone .. | .. 2 „ | 59 „ 61 „ |
| Clay .. .. | .. 7 „ | 61 „ 68 „ |

**3rd Bore**, made with Keystone Drill. Total depth 205 feet.

| Nature of rock. | Thickness. | Depth. | Date. |
|---|---|---|---|
| Subsoil .. .. | 2 feet | 0 to 2 feet | |
| White sandy clays and water | 12 „ | 2 „ 14 „ | |
| Sands .. .. | 55 „ | 14 „ 69 „ | |
| Drift sand and unceasing water | 6 „ | 69 „ 75 „ | |
| Coloured clays .. | 11 „ | 75 „ 86 „ | 21.5.21 |
| Pebbles and sands .. | 15 „ | 86 „ 101 „ | 2.6.21 |
| Running sands, traces of coal | 104 „ | 101 „ 205 „ | |

This information was supplied by the Engineer in charge. The water smelt offensively and was quite unfit for human consumption.

**Possible extension of the Tertiary beds.** No other coal bearing deposits have been found in Kedah or Perlis, but an area where they may possibly occur is near the road from Changlun to Singgora, beginning near the 28th mile. The country is undulating and there are no natural exposures, but a road-cutting at the 28th mile gives a certain amount of information. There are sandstones, with grain about the size of a pin head, with occasional shale bands six inches in thickness. The dip is 25° in a direction N., 60°W. There are signs of very slight faulting, and the sandstones are penetrated by very thin stringers which are probably veinlets of quartz. Two chains away weathered red shales are commoner than the sandstone and a change of about 15° in the direction of the strike shows that the beds are slightly folded. If any more prospecting by boring is carried out in the Perlis coal-bearing rocks it would be a good thing to test this part of Kedah at the same time.

**The shales contain a small amount of oil.** No exploration work in the low lying country near Bukit Arang has been done since Mr. Scrivenor's visit in connection with the bores put down by the Railways Department. Tertiary beds in Burma and the

Dutch East Indies contain oil, and so prospecting for coal in these beds can be regarded as also prospecting for oil. Shales from a locality in Siam near Bukit Arang were found to contain about three gallons of crude heavy oil per long ton, but this is much too small an amount to allow of profitable working as an oil shale proposition. It is a smaller amount than that contained in the shales at Batu Arang, Selangor.

PRINCIPAL MINES AND OCCURRENCES OF TIN AND WOLFRAM IN KEDAH AND PERLIS.

**Bandar Bahru District.** In the south of Kedah, at the granite contact near the 11th mile on the Bandar Bahru road, there are old heaps of sand and tailings in alluvial flats which seem to have been mined at one time. Between two and five miles north from Mahang, on the path to Karangan, there are a number of tin mines, not being worked in January, 1923, except that a certain number of tin stealers were mining there. They are situated in flat country, and all are quite small, evidently worked by about ten coolies to each. Bedrock had not been reached, but there were indications that it is quartzite and shale. Granite hills lie two or three miles away.

**Kulim District.** There are two lampans up the valley of Sungei Karangan on the granite hillside, where thirty or forty coolies were at work early in 1923, and tourmaline aplite seems to be the common rock. It is traversed by quartz veins containing cassiterite and wolfram, and muscovite has been strongly developed in the neighbourhood of the veins, judging from specimens obtained at Messrs. Russell and Company's Mine, Bukit Betang, near Karangan. There are old lampan workings, now abandoned, in the phyllites and sandstones west of Karangan. Tin-ore has also been mined in the past in alluvial sands derived from granite at Kulim. Mr. Scrivenor noted that *amang* which was being thrown away here by Chinese miners, in 1911, contained 41.3 per cent of monazite. The thoria content of the monazite was only 3.5 per cent, so it was not of a saleable quality.

**The foot of Gunong Jerai.** There are working mines in the quartzite and granite country on either side of Semiling, the most important being lumbongs in the sandy flat ground at the foot of the hills. Mr. Scrivenor reported, in 1919, that tin ore was also being mined near Yen, and that there were old workings west of the mountain as well as on the east, near Gurun. It was said that prospecting for a dredging scheme on the south side of the mountain showed the ground to be too patchy. An attempt was made to work the pegmatite veins at Tanjong Jaga for mica.

**Baling District.** Bukit Ibu is a granite hill about two miles north-west of Bandar (called Bongor on the map). In it are quartz veins containing cassiterite and wolfram, bearing N. 35°W. by S. 35°E, and dipping steeply to the west side. A

certain amount of work has been done following up these lodes and crushing the stone, but the mining has been confined chiefly to hydraulicing the weathered hill slope. The valley bottoms here are metamorphosed limestone, and the alluvium on them is stanniferous. Mining operations are much impeded by the very numerous boulders, and it is said that mining with a gravel pump hardly pays on account of this.

Bukit Pasir Puteh is half a mile west of Bukit Ibu, and here the rock *in situ* is a metamorphosed calcareous rock like that which forms the valley floors near Bukit Ibu. There was a layer of *karang* 1 foot thick, lying between the alluvium and the bedrock, which was being worked by monitors in March, 1922. The intake of the pipe-line is on the granite hills two miles west from here.

Bukit Setang is about ¾ mile W.S.W. from Bandar. Lampanning has exposed a contact of granite with metamorphosed calcareous rocks on the north side of the hill. It is said that scheelite occurs with the tin ore here. These three mines are worked on tribute, and in March, 1922, they were yielding about 100 pikuls of tin ore per month.

In the flat ground about ¼ mile south of Bukit Setang, near the 51st mile, there was an opencast mine working in March 1922. Here the karang was 4 feet thick, lying on a bedrock of altered schistose quartzite about 20 feet below ground level.

**Gunong Jong.** The northern end of the jungle-covered ridge which is behind, and *en échelon* with Gunong Jong, and about 1½ miles N. 35°W from the northern end of it, was being lampanned in July, 1922. Gunong Jong is the western limestone hill of the range near Baling. Folded metamorphosed calcareous rocks, rich in pyroxene and garnet, constitute the bedrock, but there is quartzite near, judging from the presence of boulders of the rock. Eight coolies were at work on a new lumbong in the valley land between here and Gunong Jong, and here too metamorphosed limestone forms the bedrock. There is an abandoned lumbong about 1½ miles W.S.W. from the north end of Gunong Jong in an area of flat land. There are very abundant pebbles of quartz and schistose sediments, and occasionally there are granite pebbles too, but bedrock cannot be seen. It was said that the mine was abandoned owing to the difficulty in getting water to work it.

**Near Bukit Lata Pa Palang.** The granite of this mountain and that to the north, both in Siam and Kedah, is stanniferous and a number of mines are working in the neighbourhood. A journey was made from Siam, across the boundary at stone 49 B, but the mines were not visited. Mr. V. G. Bell, Conservator of Forests, Kedah, sent some samples in July, 1923, from Klian Sungei Mas, a mine situated four very difficult elephant

stages through dense jungle from Weng. He said that the tin appeared to be quite near the surface of the ground, in alluvial deposits on the sides of a small valley, and was easily obtained by letting bucketsful of water trickle down the face of the working, and by lampanning. The mine was reported to be rich, but although it was called Sungei Mas, the Chinese said there was no gold there. Each coolie was said to extract 1½ pikuls of tin ore per month.

**Between Sik and Jeneri.** As already mentioned, there are old lampan workings at Charok Keh, on the slope of Bukit Enggang about two miles north-west from Sik, and upstream in Charok Tawar, near the land held recently by the Badak Company, there are abandoned tin mines that were reported to have been worked in about 1919. They were pits dug in alluvial sands lying on a bedrock of quartzite, and were worked only by a small number of coolies.

**Ulu Muda.** Chinese used to carry on mining in the valley of Sungei Debu, a tributary of Sungei Muda above Kampong Kelian, but little is known of the place. It is near a contact of granite with baked shale and quartzite. It is said that mining was stopped because the water irrigating the rice fields was being fouled.

**Pintu Wang.** At Pintu Wang on the granite contact about five miles due east of Bukit Tinggi, there were two mines working in July, 1922. They are about nine miles walk from Sintok, and about fourteen from Kuala Nerang. The mine which had been worked longer there used to give 10 or 12 pikuls of tin ore each day, but in July, 1922, it was nearly worked out. One gravel pump was being used, and the source of power was water brought in a pipe-line half a mile long from a dam up in the neighbouring granite hills. The bedrock in the mine was porphyritic granite, but the commonest boulders were schist, and quartz with tourmaline was also common. A little wolfram was found with the tin ore. It was intended to transfer operations shortly to a new site, where, according to the *Kepala*, boring results had given 3 katis per cubic yard. Half a mile along the track to Lubok Ipoh (which is near Kampong Kejai, on Sungei Padang Terap) thirty coolies were at work removing the overburden in a newly opened mine. There were getting about 60 katis of tin ore a day, but they had not yet reached *karang*. About four miles north-west of the Pintu Wang alluvial mines it was reported that lode tin was being worked in granite, but this mine was not visited.

**Ulu Badak.** Tin stealers were lampanning in May, 1923, near boundary stone 28 at the Siamese boundary. They were getting tin ore from thin deposits of valley alluvium, and also from the weathered hill slopes of porphyritic granite and mica

Schist. Sungei Badak is called Sungei Kelubi locally, near the boundary. The hills on either side of the main valley, and also the tributary valleys in granite country are being lampanned, but most work is going on a short distance downstream from the contact, in quartzite schist. The valley sides that are being lampanned have quite high faces, and all show dark red soil overlying stony *karang* on schist bedrock. Wolfram was noted in fragments of quartz.

The path from Sungei Badak to Sintok, west of the granite contact, has a side track branching off to Kampong Seraya, from where Sungei Machang and Sungei Pasir Puteh meet. Here is a hill of tourmaline schist traversed by quartz veins containing tin ore and shafts have been sunk on them. Some veins are as much as a foot across, and the line of direction of the shafts, which probably coincides with the direction of the quartz veins, is N, 23°E by S, 23°W. The quartz is hand picked and those parts thought to contain cassiterite are broken up with a hammer and then carried to the nearest stream to be washed up. A sample of the crushed quartz contained only about ¼ per cent of cassiterite.

There are one or two lampans in the quartzite and schist country between here and Sintok.

**Near Sintok.** On the north side of the Padang Pelandok Valley, about 1 mile upstream from Sintok, is land held by Mr. J. C. Pasqual, where a certain amount of prospecting has been done on lodes. One lode had been driven on, in a northerly direction into a hillside. The quartz vein was 1 foot in width, with a steep dip to the east. Cassiterite occurred on both sides of the vein in the quartz. The country rock was sandy schist, much weathered, so that the walls were very insecure, and a considerable amount of timbering had to be done. There was no sign of faulting on the walls of the lode. A good deal of money was spent in installing machinery to crush the stone won from these lodes, but the mining proved to be unsuccessful. When the mine was visited only two or three coolies were at work.

**Padang Pelandok.** On the Padang Pelandok Company's property there are several places where mining is going on. A gravel pump was working in No. 3 Mine, near Kuala Pinang, in May, 1923, and the following was the section exposed:—

River alluvium.....5 feet
Sand.....6 feet
Stony karang.....6 feet
Schist bedrock.....

The stones in the karang averaged about 4 inches across but they were occasionally several feet across. The foliation planes in the schist bedrock dipped 15° to N.N.E. Some of the boulders

of schist in the karang were veined with aplite. At Kuala Pinang near here there was an old lampan with this exposure:—

Red soil.....8 feet

Stony karang.....9 feet

Quartzite and hardened shale bedrock.

The quartzite and shale dipped 15° to the north. The *karang* is cemented for its lower 3 feet with red ironstone concretions.

About a quarter of a mile up Sungei Pinang the Padang Pelandok Company had hydraulicised the soil and weathered schist on a low hillside. Here the dip of the schists was to N. 50°E and they were traversed by quartz veins striking east and west. One quartz vein that was examined was about one foot thick. It dipped gently to the south at an angle of 20° from the horizontal. It contained cavities lined with small crystals of cassiterite, and crystals of wolframite were also seen in the quartz. The schist bedrock is tourmalinised sandstone.

**Bukit Kachi Tin and Wolfram Mine.** The mine worked by tributers for J. A. Russell and Company is about 1½ miles N. 15°W from where Bukit Tinngi, 2525 feet, is marked on the map. It is about half a mile S.S.W. from the point where the path crosses the boundary of Padang Pelandok property. A hill of tourmaline schist, several hundreds of feet high, is traversed by parallel quartz veins in direction N., 15°W by S., 15°E. When the mine was visited, in May, 1923, work was being carried on by shafting on the veins, and driving levels along them whenever the Chinese miners thought that it would be worth while. About 60 shafts had been sunk to varying depths on at least four distinct parallel veins, and old trenches and open-cuts marked old mining operations. The most easterly of the four veins that are being worked is the one which outcrops lowest on the hillside, and the line of outcrop is still several hundreds of feet above the stream bed in the valley below, and this height together with the previous nature of the weathered toormaline schist, ensures that there is no trouble with water in the workings.

**Examination of a wide quartz vein.** A descent was made to examine part of the most easterly vein. The shaft descended was 140 feet deep, and its lateral measurements were 3 feet 8 inches by about 2 feet, just enough to allow the passage of a basket, pulled up by a windlass. It was timbered and rivetted all the way down. The country rock was quite soft at the bottom, just as it was at the top, and in this shaft there was no need for blasting, as the quartz broke easily with a pick. The lode had been driven on to the south for about 20 feet. It was more or less vertical, and at a depth of 140 feet it was 3 feet 8 inches wide. This was the widest vein seen on the mine. The ore was rather patchy, and flakes of muscovite were very

common in the quartz and on the walls of the vein in those parts where ore minerals were abundant. At the bottom of this particular shaft, crystals of wolfram were seen in the quartz, but there was little or no cassiterite.

About 10 chains to the west, further uphill, is the second vein. At that point nearest to the shaft last described, it was marked by an open-cut in hard country rock, but work here had been abandoned because blasting was necessary, and this was too expensive a mode of working for the tributers. The width of the vein exposed in this open-cut was only 8 inches to one foot. It contained both wolfram and cassiterite, like all these veins.

**Old workings.** A few chains further west, uphill, was another line of shafts sunk on a lode said to be from 5 inches to one foot across, and, judging from the number of shafts up which rich mixed cassiterite and wolfram ore was being hoisted, there was no doubt that it was paying the tributers handsomely. On following the lode in direction N. 10°W., down the north side of the hill, a huge trench was found, 25 to 30 feet wide, about 10 or 15 feet deep, and 100 yards in length, cut from fairly hard country rock. It is said by the Chinese now working on the mine that the trench was made in older times by Siamese. They burnt fires on the rock, and thus split up the stone. At present there are a number of shafts being worked, sunk in the bottom of this trench. The amount of muscovite in the stone brought up is noteworthy, and there is a great quantity of wolfram, much more than there is cassiterite.

1½ chains further west, and near the top of the hill is the fourth line of shafts, and here too, work is busily going on. Many specimens of ore brought up show vein quartz with cassiterite and wolfram associated with muscovite.

**Treatment of the mixed ores.** Altogether a few more than 300 coolies were being employed, and the tributers said that they got over 300 pikuls of tin ore per month. Six years ago when the price of wolfram was high, 800 coolies were employed, and they used to get 1000 pikuls of wolfram a month. When the mine was visited in May 1923, the method of treatment of the stone was to break it up with hammers as it was brought up by the windlass, and it was then handpicked and all the wolfram that could be separated was put aside. The remaining stone containing the cassiterite was broken under the hammer to small pieces, giving a *karang* said to contain about 5 per cent of tin-ore. This was pounded with footstamps and washed, the resulting ore still containing a certain amount of wolfram. In May, 1923, it was sold to a dealer in Alor Star, for $58 a pikul, a deduction of $6 or $7 being made by him on account of the wolfram mixed with it.

Messrs. J. A. Russell & Co., the owners of the property, collect from the miners a certain amount of tin ore as tribute in kind, and they purchase wolfram at fixed price, the two parcels being kept separate. The mill returns do not support the view that the ratio of the percentage of cassiterite to that of wolframite increases in depth.

On page 16 of his paper on Tin and Tungsten Deposits (vide previous literature), Dr. Jones mentions the "Wolfram mines of Kedah, north of the Federated Malay States. Wolframite and cassiterite occur in very wide quartz veins in schists, phyllites and quartzites. The veins are slightly felspathic in parts. A little tourmaline occurs, and pyrites and arsenopyrite are present in the least weathered parts of the lodes," and on page 26 "———the famous wolframite areas in Kedah, north of the Malay States, where wolframite is mined in quartz-veins in metamorphosed sediments several hundreds of feet above the neighbouring tin mines. In the Kedah wolframite mines it has been proved that in depth the percentage of cassiterite to wolframite increases."

In a footnote Dr. Jones says that he visited the Kedah mines between June and October in 1919, and adds that the proof of the percentage of cassiterite increasing in depth relatively to the percentage of wolframite was privately communicated by the owners, Messrs. Russell.

The mines are those just described. There is no evidence at the present time that in depth the percentage of cassiterite to wolframite increases, and Messrs. Russell in a letter dated 10th May, 1923, say:—

"We think the idea that the tin contents increased with depth was given rise to by the fact that when we first opened the outcrops, the output was nearly all wolfram with merely a trace of tin, but at a depth of about 15 feet, tin became more in evidence, averaging 10 per cent, However, as our workings have deepened, the percentage of tin has not increased."

### Tin Mining in Perlis.

**Bukit China.** Except for the mine worked by Tanga Tin Limited, at Kaki Bukit, the only tin mining that is being done in Perlis is in the limestone caves of the Setul boundary range. Some years ago the south-western slopes of the granite mountain Gunong China were prospected near the limestone contact, with a view to hydraulicing the weathered rock and soil, but boring results were too poor to permit of anything being started.

**Cave deposits.** It is thought that the deposits of tin ore that are mined in the limestone caves have been deposited by subterranean streams flowing from the granite slopes of Bukit China Until recently, the only method used in mining them

was to follow these old stream-channels downwards using ladders and ropes to pass down pot-holes, and blasting through the narrow cracks to widen the passages wherever it was necessary.

**Goa Geti.** Mr. Graf supplied information about Goa Geti, a cave in the limestone about a mile south of Kaki Bukit. He noticed that in flood time, water was squirted with considerable pressure from cracks in the limestone at the foot of a limestone cliff, and he found traces of tin ore in the sand and clay that was ejected by these jets. He commenced blasting operations, and after a while exposed the mouth of a cave with a floor area of about 1 acre. A fissure in the roof was completely filled with cemented limestone conglomerate. He sunk a few bores in the channel of the stream flowing through the cave which gave encouraging results, and a Syndicate was then formed to carry on with the development work that was necessary. An adit was being driven in from the level of Sungei Pelari, with a gradient up of 1 in 200 to reach the floor of the cave and drain it, and when this should have been done it was anticipated that the main difficulty of working the deposit would be overcome.

**Tanga Tin Limited.** Sir John Campbell, in February, 1926, gave the following information about the mine owned by the Tanga Tin Company, Limited at Kaki Bukit. A deposit of clay (kong) was the downward limit of working in February, and bedrock had not yet been reached. The average thickness of the overburden was 25 feet, and it carried a little tin ore from top to bottom. The *karang* was a stoney clay, varying in thickness from a few inches to eight or nine feet, and values varied from ten katis to two pikuls per cubic yard. The monthly output was about eighty pikuls, working for 10 hours a day. Clear spring water seeped from the bottom which was several degrees warmer than the river water. All the ore was very waterworn, and Sir John Campbell thought that it had been transported by a river rising in Bukit China and running under the limestone cliffs.

## The Prospects of Mining in Kedah and Perlis.

### Tin ore and wolfram.

**Between Karangan and Mahang.** The granite, sedimentary rocks, and the alluvial deposits, between Karangan and Mahang might be prospected for tin ore and wolfram. The mines being worked, and those abandoned, are, however, not of much importance, and, as the district is by no means inaccessible,

it is likely that Chinese prospectors have already been over a lot of the ground, and that no extensive rich deposits remain to be discovered. Some of the alluvium in the flat ground may prove to be worth dredging.

**Near Gunong Jerai.** Prospecting in the neighbourhood of Kedah Peak should be encouraged, particularly in the country between Semiling and the sea. The very strong development of pegmatite veins rich in tourmaline is a favourable indication. Many instances of pegmatite veins are known elsewhere where no valuable ore deposits occur, but in this district mines have been worked for a number of years, by open cast methods in alluvial deposits, and by lampanning weathered granite and schist, and it is likely that the mineralisation is closely connected with the presence of these abundant pegmatite veins. The alluvium in the plains could easily, be prospected, but the northern contact of granite and schist, up in the hills, is in extraordinarily difficult country, and it is probable that most of it has never been examined. If the shallow alluvial deposits and the weathered granite and schist near the contact were removed, it is quite possible that tin bearing lodes would be discovered.

**The Weng Valley.** Tin deposits near Baling and Bandar are being mined by small *kongsis* of Chinese. In one mine near Bandar, tributers are working with European methods. It is said that the poor results at this mine are due partly to the large number of boulders which make it impossible to lift the ore with gravel-pumps. There are no mines north of here, but the amount of prospecting that has been done is not known. Perhaps the new road will bring miners to the neighbourhood, and they should be encouraged to prospect up to Tanjong Pari, if their work would not interfere much with the rice-fields. The geology and topography of the valley is favourable for the accumulation of tin deposits, but, as yet, no evidence has been noted, to the north of Bandar, that the granite of the hills on the west side of the road is tin bearing.

**In East-Central Kedah.** The granite near Bukit Lata Pa Palang and to the north is tin-bearing, and mines are working there both in Kedah and Siam. The district is very inaccessible, Klian Sungei Mas being four very difficult elephant stages through dense jungle from Weng. Still further to the north the neighbourhood of the granite intrusions between Jeram Nyek (Kg. Nior) and Ginting Reh seem to be good places for a prospector to examine, but all this part of Kedah is difficult to get at.

**Near Sintok.** The neighbourhood of the granite mass which extends about ten miles to the south from Ulu Badak is perhaps the most promising mining district in Kedah and Perlis. Mining operations are being actively carried on near the western margin of the granite, and at Pintu Wang, and it is probable that prospecting in the alluvial deposits and the weathered granite and schist will result in more mines being opened.

**Setul limestone range.** In Perlis tin deposits are not likely to occur, except near Gunong China, and in limestone caves. A certain area of the granite on Gunong China has already been prospected, and the results obtained did not warrant any further work being done. A good deal of mining has been carried on in the limestone of the Setul Range, and from the account which has already been given it will be gathered that it is very much of a gamble. The ore is taken out as soon as it is found, and there is no way of finding whether the passages still unexplored contain tin-ore, without actually going there and digging out the clay and sand in them.

**Wang Tangga.** Mr. A. J. Kelman had nearly fifty bores put down in Wang Tangga, in 1925, but the results were disappointing. In a few cases he had bores averaging half a kati of tin ore from top to bottom, but the combined result for all the bores was only .2 kati per cubic yard. At the end of the *wang*, near Kaki Bukit, the ground was 40 feet to 50 feet deep.

## Iron Ore.

**Between Gurun and Bedong.** Deposits of iron ore are known in the neighbourhood of Gunong Jerai, and perhaps the most important one is in a newly-planted hill lying between the road and railway near the 26th mile from Alor Star. No prospecting work has been done to determine the precise quantity available, but from the surface indications it is probable that there is a large mass of ore. Boulders and outcrops of the ore can be seen on the surface at several places hundreds of yards apart, and the uniformly deep red colour of the soil indicates that haematite makes up a great part of the bedrock. The ore was recently used as roadmetal by the Public Works Department.

**An analysis for comparison with other iron ores.** An analysis by Mr. J. C. Shenton, Chemist to the Geological Department, Federated Malay States, gives the results shown in column I which can be taken as fairly representative for the surface outcrops. For purposes of comparison, analyses of other Malayan ores are given in columns II and III, and columns IV to VII give analyses of English, American, and Spanish ores, that are commonly smelted in England.

| | I | II | III | IV | V | VI | VII |
|---|---|---|---|---|---|---|---|
| | 26th mile from Alor Star, Kedah. | Bukit Medan, Johore, exported to Japan | Gunong Panjang Estate, near Ipoh. | Cumberland. | Whitehaven (analysis given by T. E. Thorpe in 1896 | Imported for Smelting in England. Lake Superior | Imported for Smelting in England. Spanish ore Yellow Rubio |
| Iron peroxide $Fe_2O_3$. | 90.85 | 99.4 | 98.14 | 72.57 | 95.16 | 73.71 | 77.14 |
| Manganese protoxide, MnO | .. | .. | 0.50 | trace | 0.24 | 0.43 | 0.99 |
| Alumina, $Al_2O_3$. | .. | .. | .. | 4.37 | .. | 1.82 | 1.66 |
| Lime, CaO | .. | .. | trace | 4.87 | 0.07 | 0.16 | 0.22 |
| Magnesia, MgO | .. | .. | trace | 0.50 | .. | 0.26 | trace |
| Insoluble matter | 1.30 | .. | 0.87 | 12.80 | 5.68 | 16.67 | 8.93 |
| Sulphur | 0.01 | .. | 0.013 | 0.02 | .. | .. | 0.02 |
| Phosphoric acid, $P_2O_5$ | 0.63 | .. | 0.197 | 0.16 | .. | 0.27 | 0.07 |
| Carbonic acid, $CO_2$ | .. | .. | .. | 3.73 | .. | .. | .. |
| Water and loss on ignition | 4.60 | 0.3 | 0.38 | 0.96 | .. | 6.50 | 10.70 |
| | 97.39 | 99.7 | 100.10 | 99.98 | 101.15 | 99.82 | 99.73 |
| Metallic iron | 63.6 | 69.6 | 68.70 | 50.80 | 66.6 | 51.60 | 54.00 |
| | | Th average assay value of the oreexported is 64, | | | | | |

**Possibilities of the iron ore ever becoming valuable.** The samples from Kedah are very good iron ore, but the percentage of phosphoric acid is rather high. A further refining process of the pig iron would be necessary, and this would send up the cost of smelting. As mentioned above, the analysis is representative only of the surface outcrops, and nothing is known of the interior of the hill. It is not thought that any use can be made of the deposit now. The cost of smelting the ore on the spot, by using coke or charcoal, would be prohibitive. The only way to do it would be to smelt in an electric furnace, when the amount of coal or coke necessary would be much smaller. It is possible that supplies of cheap electric power will some day be available at the foot of Gunong Jerai, so it is well to bear in mind the presence of this deposit of iron-ore. The ore could never be exported to compete with that which is being shipped to Japan from Bukit Medan, near Batu Pahat, Johore. The only available analysis of the Bukit Medan ore is higher in iron, but the real deciding factor is the cost of getting the ore into ships. If a canal were constructed from the hill to Sungei Merbok, lighters could carry the ore out direct to sea-going steamers, but it would be necessary to make sure of the presence of many millions of tons of high grade ore, and to arrange for low freight rates, before the outlay of such a large sum of money could be contemplated.

**Magnetite on Gunong Jerai.** Mr. Scrivenor described as follows a deposit of magnetite near the summit of Gunong Jerai, a few years ago, in the Geologist's Annual Report for the year 1919, supplement to the Federated Malay States Government Gazette, October 22, 1920:—

"..... in only one locality was there any suggestion "of the magnetite being concentrated in workable quantities. "This is on a jungle path that descends from near the sanato- "rium site down the Yen Valley. On this path about a quarter "of a mile below the main path to the summit of the mountain, "there are outcrops of magnetite and hydrated oxide of iron in "quartzite. To prove the extent of the deposit it would be "necessary to clear a lot of the jungle and strip the surface "in its vicinity. Without this it is impossible to make any "statement about the value of the deposits; but one favourable "point is that there is a steep descent on which aerial rope-ways "could be worked to the neighbourhood of Yen Village, which "is close to the coast. The mode of occurrence of the magnetite "in the quartzite suggests that it has been leached out of the "granitic rocks and redeposited from solution in fissures."

The deposit has been examined since, and it seems to extend for about 200 yards down the steep slope, more occurring on the north-west side of the path than on the south-east. About 200 yards from the path on the south-east side a vein of quartz and

magnetite was examined, not very rich in magnetite, striking N. 60°E by S., 60°W. and dipping towards S. 30°E, at an angle of 40° from the horizontal. A band four feet wide, of almost pure iron ore, was exposed in a stream bed on the north-west side of the path. The quartzite for some distance below the magnetite outcrops contains an unusual amount of pyrites.

**Other veins of iron ore on the west slope of Gunong Jerai.** Further down this west side of the mountain, on the path at a point about three quarters of a mile from the foot, and not far from some exposures of pegmatite, there are a number of veins of iron ore in the quartzite, striking N. 60°E by S. 60°W like the ore half a mile from the sanatorium. Magnetite also occurs disseminated through the quartzite. It is likely that there are more deposits on the western slopes of the mountain away from the path.

## Coal and Oil.

**Restricted to Tertiary beds.** The only rocks in which there is a chance of finding coal and oil are the Tertiary deposits, which so far are known to occur only in one locality near Bukit Tinggi on the Perlis Siam boundary. The metamorphosed nature of the pre-Tertiary sedimentary rocks precludes the possibility of their containing workable seams of coal, and the arenaceous members are not sufficiently porous to function as reservoirs for oil. It is known that the Recent deposits which make up the large area of coastal alluvium do not contain either coal or oil. The Tertiary deposits and the prospecting work done on them are described in a separate chapter.



FIG. 1.



FIG. 2.

EIGHTEENTH CENTURY TOMB-STONES AT PEKAN, PAHANG.

# An XVIIIth Century Tomb at Pekan Lama.

*By* W. LINEHAN.

(PLATE XIV.)

Behind the enclosure surrounding the residence of the Tengku Empuan Tua, Pekan Lama, stand two grave-stones on a small mound. Their shape and ornamentation are unlike that of any other tomb stones to be found in Pekan. They bear an inscription in *Jawi* recording the date and the Muhammadan profession of faith. The name of the deceased is not written, possibly because the panel of the stone reserved for it had been damaged when the stone was being carved. The letters of the inscription differ from those of the epitaphs on other ancient tomb stones in Pekan by being incised in the stone: they do not stand out. Each stone is provided on one side with two panels, one circular, one rectangular. On the southern stone, south face (Fig. 1) within the circular panel is written vertically:—"There is no god but God and Muhammad is His Prophet."

Within the rectangular panel is written:—

*hijrat 1128 pada ta-*
*-hun pada bulan*
*Shaaban pada hari Khamis.*

On the north face of the southern stone (Fig. 2), at its base, the date is again written:—*hijrat 1128 pada 23 hari Shaaban,*

The curious mistake is made of writing the figures representing the day of the month and the year so as to read from right to left instead of from left to right. The 23rd Shaaban 1128 A. H. corresponds with the 12th September, 1716 A. D.

The northern stone, north face, bears an inscription within the circle similar to that on the southern stone. The rectangular panel is empty.

According to tradition the grave is that of an Achehnese named Tengku Mutahir who killed his brother, Tengku Abdullah in a fight, and was himself killed in turn. They were buried side by side. An old Malay who lives near the spot informed me that the grave of Tengku Abdullah had also been marked by stones of the same type as those described here, inscribed with the name of the deceased and the date of his death. After a search I found a fragment of one of the stones to which he referred embedded in the soil by the side of Tengku Mutahir's grave.

# The Bendaharas of Pahang.

*By* W. LINEHAN.

In this article it is proposed to deal only with the Bendaharas who ruled in Pahang after the extinction of the line of Pahang and Johore Sultans of Malacca royal stock. The bearers of that title in the time of the old Sultans of Pahang were merely the raja's ministers. The Bendaharas who emerge on the disappearance of the original Sultanate, though nominally the regents of the Sultan of Johore, were virtually independent rulers.

Pahang was colonized by Malays from Malacca about the middle of the fifteenth century, and Muhammad Shah who died in 1475 A. D. was the founder of the original line of Pahang Sultans. Malacca, being the senior Sultanate, claimed a suzerainty over Pahang which was not always admitted by the rulers of that country. After the fall of Malacca in 1511 A.D. the hegemony of the Peninsular Malay States passed to Johore. The old line of Pahang Sultans continued until the latter part of the seventeenth century when it either became extinct or merged in the Johore Sultanate. A Pahang prince (Ibrahim Shah) became Sultan of Johore about the year 1675 A.D. He died in 1685 A. D. It is possible that he united the Sultanates of Pahang and Johore in his own person. He was succeeded by his son Mahmud Shah (*Marhum Mangkat Berjulang*) whose death in 1699 A. D. marked the end of the line of Sultans of royal Malacca stock ruling in Johore.

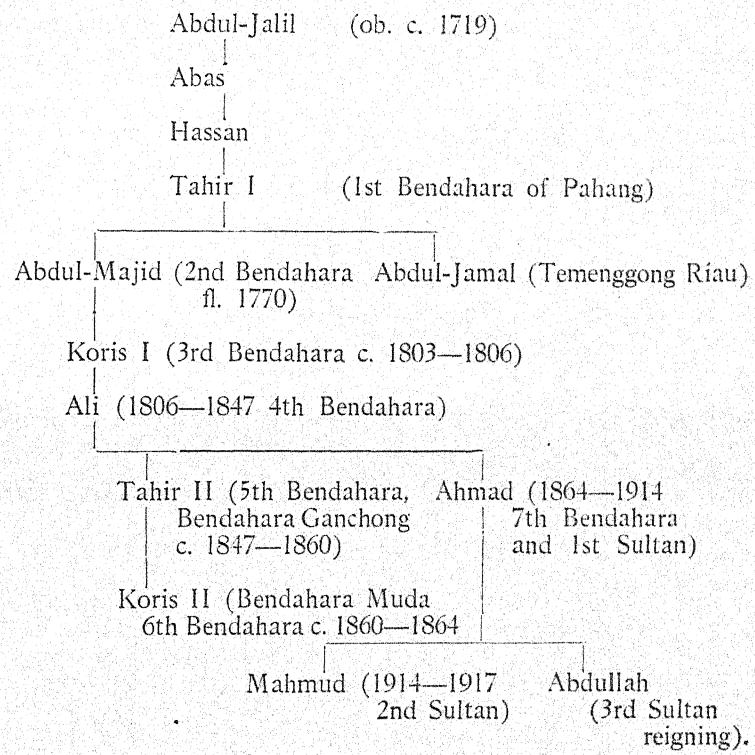
It is not certain who were the local rulers in Pahang from the latter part of the seventeenth until about the middle of the eighteenth century but a vague tradition has it that, during that period, the country was ruled from three localities Pekan, Lubok Pelang, and Luit.[1]

The middle of the eighteenth century saw the establishment of the Bendaharas in Pahang. They came from Johore and ruled nominally as representatives (*wakil*) of the Sultans of Johore, but the weakness of the Sultanate left them practically unfettered control. According to tradition they were descended from Abdul-

1. The Achinese and Bugis invasions probably caused a state of anarchy which had the effect of dividing the country into petty principalities.

Jalil who made himself Sultan of Johore in 1699 A.D.[1] Wilkinson thinks it probable that they were descended from a brother of Abdul-Jalil.[2] At any rate it is certain that they were the descendants of the Bendaharas of Malacca either through Abdul-Jalil or one of his brothers.

Following is the pedigree of the Pahang Bendaharas as accepted by the present royal family:




The correctness of this table running from Abdul-Jalil down to Hassan is very doubtful. It differs from the genealogical table derived from Johore sources. Abdul-Jalil died about 1719. We know that Abdul-Majid was alive in 1770. If the pedigree here given were correct we should be compelled to fit in four generations within a period of fifty one years.

1. He was deposed about the year 1717 and fled to Pahang. He was followed up by his enemies and stabbed to death at Teluk Kandang which from that occurrence, came to be known as Kampong Marhum. (Teluk Kandang is the "Pasir Kandang" of the Malay Annals).

2. History (third edition) pages 82 and 83.

Tahir I is omitted from the Johore table which names Abdul-Majid as the first Bendahara of Pahang. It is very probable that in this respect the Pahang pedigree is correct. The tradition that a *Tahir* was the first Bendahara is definite, and a tomb said to be his is still pointed out in the grave-yard of the Bendahara at Kuala Pahang. From Abdul-Majid onwards the Pahang and Johore pedigrees agree.

Tahir I had five children: Tun Selamah who married a Bugis Chief of Selangor (after whom Tanjong Selangor at Kuala Pahang Tua is said to have been named), Abdul-Majid, Abdul-Jamal Temenggong Riau, Usop of Tembeling (killed in Riau), Mohamed who migrated to Trengganu, and Abas of Semantan. Abdul-Majid succeeded his father as Bendahara. In the Pahang State Regalia is a gold buckle (*Pending*) which bears his name and the date 1184 A.H. (1770 A.D.). His children were: Da, Koris, Mohamed, Abdul-Talib, and Tun Khatijah.

Between the death of Abdul-Majid and the installation of Koris I there was a short interregnum during which Sayid Mahussein son of an Arab named Sayid Abdul-rahman[1] was in charge of the country as *Pemangku Bendahara*. Koris (the *Bendahara Paduka Raja*) was reared at Endau by his Bugis mother. He reigned for only three years. He was notorious for his cruelties and is said to have committed innumerable murders for the mere lust of killing. His kris of execution (*kris penyalang*) is preserved in the State Regalia. He left two sons Ali, and Mohamed (styled "Engku Tanjong").[2] The former, who was installed in 1806 under the title of *Bendahara Sewa Raja*, enjoyed a long reign, dying in 1847.

According to tradition Ali was a strong ruler, and during this reign the country enjoyed comparative immunity from internal disturbances. He exterminated a nest of Bugis pirates who, under the leadership of Wok Tamusai, had established themselves on the Rompin river. Ali was popular with his subjects. In appearance he was short and thick-set; his grand-son, the late Sultan Mahmud, is said to have borne a striking resemblance to him. He married, amongst other wives,[3] the daughter of a Bugis Chief from Endau. He had eleven children: Sulong, Tahir, Ismail, Teh, Ahmad, Timah, Supiah, Esah, Andak, Hassan

1. Great great grand-father of Sayid Abdulrahman, Senior Agricultural Assistant, Pekan. The graves of Sayid Abdul-rahman and his wife (Che' Puan Mah Dewi, a reputed relative of the first Bendahara) at Kuala Pahang are marked by tomb stones. The tomb of the former is inscribed with the name of deceased and that of his father Abdullah, (the rest of the inscription is hardly legible).

2. The "Tengku Tanjong" mentioned in Abdullah's *Pelayeran*.

3. One of whom (Che' Nik) met with a tragic fate. She was convicted of infidelity and strangled (*di-kujut*) at Kuala Ayer Hitam.

and Mansur. Ismail is the ancestor of the present Orang Kaya Indera Pahlawan "To' Raja Cheno" (one of the Orang Besar Berempat),[1] and of Che' Engku Salleh, Temenggong.

Ali had his residence at Pekan Sebrang, but in his old age he deserted the capital and established himself at Lami on the river Pahang Tua.

The quarrel between Tahir and Ahmad which later was to develop into open hostilities, was fostered by their respective adherents during their father's life-time. Tahir took up his head-quarters at Pulau Ganchong, (hence the name *Bendahara Ganchong* by which he later came to be called), while Ahmad remained at Pekan. Tahir's mother is said to have been a concubine of the Bendahara, whereas Ahmad's mother, Che' Long, had been married to Ali.[2] Ahmad conceived that he had a better claim to the succession on account of his superior legitimacy. Tahir was in the main supported by the elder Chiefs including Engku Tanjong and Engku Sayid.[3] Ahmad had comparatively few followers amongst them. On the death of Ali, Tahir assumed the Bendaharaship with the title of *Bendahara Sri Maharaja*. Ahmad fled to Singapore and took refuge with Sultan Ali. The Temenggong of Johore, an enemy of Sultan Ali, naturally looked upon Ahmad with no feelings of friendship and gave his support to Tahir and later to Koris. Ahmad, (who in 1858 had assumed the title of *Bendahara Sewa Raja*), made many attempts to expel his brother from Pahang but without success.

Tahir died about 1860, and was succeeded by his son, Koris. The latter, in order to strengthen his position, made an alliance with the Temenggong Abu Bakar of Johore whereby, in return for armed assistance, he agreed to cede a large portion of Pahang territory to the Southern State. Ahmad, after several abortive attempts, invaded Pahang overland about the year 1863. The adherents of Koris were decisively defeated at Pekan Lama

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1. The other three are: Wan Tanjong, Orang Kaya Maharaja, Jelai, whose grand-father Wan Idris came from Johore; the Orang Kaya Indera Segara (this office is at present vacant)—the former holder was also of Johore descent—; and Che Osman, Orang Kaya Indera Shahbandar, whose father was Imam Perang Indera Makhota. The former "To' Bandar" was descended from To' Tuan a Bugis Chief who, in the eighteenth century, founded Kampong Mengkasar, Pekan Lama. To' Tuan is said to have introduced the art of weaving in silk into Pahang. His burial place at Pekan Lama is revered as a *Keramat*.

2. The use of the word *gundek* is confusing. *Gundek* in Pahang means (*a*) a concubine, or (*b*) a non-royal wife of the raja. Che Long though a *gundek* in the sense of (*b*), was legally married.

3. An Arab, he married one of Ali's daughters and acquired great influence in Pahang. He is mentioned in Abdullah's *Pelayeran*. His grave at Kuala Pahang is marked by a fine (but decayed) wood carving.

where sixty of his Bugis followers from Johore were killed.[1] The struggle dragged on for some time at Tanjong Teja, Kuala Pahang, but the issue was no longer in doubt, and on the death of Koris, which event occurred about 1864 A.D., his party fled from Pahang.[2]

Ahmad had received considerable financial assistance in his contest for the Bendaharaship from some wealthy Chinese. After his victory he rewarded them by giving them the salt and chandu Monopolies of Pahang together with the privilege of minting *tampang*, the tin currency of the country. He recalled those exiled Chiefs who had supported Tahir and Koris against him, and restored to them their former rank, but with a limitation of their former powers. The Pahang expedition of 2000 men sent by Ahmad to the assistance of Tengku Dziau'd-din of Selangor in 1872 enabled the latter to turn the scales against Raja Mahdi. In October 1877 a treaty was concluded between the Governor of the Straits Settlements and Ahmad whereby the title of Bendahara was raised to that of Sultan, and Ahmad agreed to the appointment of a Governor's Agent in Pahang having powers similar to that of a Consular Officer. The following year saw the establishment of a British Resident in Pahang.

All the Bendaharas, with the exception of Tahir II and Koris II (the *Bendahara Muda*), are buried in the royal grave-yard at Kuala Pahang..

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1. Their last stand was made in the mosque the remains of which are still to be seen.

2. An account of the struggle between Ahmad and his relatives is given in the *Hikayat Pahang* a typed document of over 200 sheets (of which the first 50 are unfortunately missing in the Tengku Besar's copy but Dr. Winstedt possesses a complete version). I have not been able to ascertain the name of the author. It was written about the year 1910. The Civil War is also dealt with in the *Shaer Tanah Melayu* published in Singapore in 1900 ("terchap di-atas batu dalam negri Singapura dengan terchap Haji Mohamed Amin nomber 15 Kampong Dalam Lorong Kechil').

Both the *Hikayat* and the *Shaer* were kindly lent me by the Tengku Besar of Pahang in whose possession they are. I am also indebted to him for the loan of a *salasilah* of the Bendaharas.

## Royal modes of Address in Pahang.

*By* W. LINEHAN.

There is only one raja in Pahang and that is the Sultan. Only he may be addressed as *Tuanku.* All other descendants, on the male side, of the late Sultan Ahmad, (including the Tengku Besar) are styled *Tengku. Che' Engku* is the title accorded to descendants from the Bendaharas on the male side, (except the above), whose mothers are at least of equal rank (*satara* or *sama gara*) with their fathers; where the mothers are of inferior rank the children are styled *Che' Wan.* This distinction is rigidly observed, except that a few who come under the latter category have been given the style of *Che' Engku* on their marrying descendants of Sultan Ahmad. Descendants of the Bendahara on the female side take their father's rank. The practice of according Sayids the title of *Engku* continues to the present day (*c.f. Pelayeran Abdullah*:—" Maka bahasa marika itu (*i.e.* the people of Pahang) kapada orang Arab itu saperti berbahasa kapada raja-raja: maka apabila ia berkata-kata dudok-lah ia dahulu memberi hormat, ' bertengku ' dan ' hamba tengku ' ").

## Silsilah Melayu dan Bugis dan Sakalian Raja-raja-nya.

Written by the wise and honourable, the late Raja Ali Al-haji, son of the late Ĕngku Ahmad Al-haji of Riau and Pĕnyĕngat.

*Translated by* HANS OVERBECK.

When after an absence of many years I was rummaging again the Malay bookshops of Singapore in Arab Street and its neighbourhood, I found the above book, printed in Singapore A.H. 1329 (about A.D. 1900).

Prof. Otley Beyer of the University of the Philippines, Manila, had asked me to look out for any Malay literature which could throw light on the connections between the Malay kingdoms of the British and Dutch East and those of the Southern Philippines, and I went through this book in the hope of finding some traces. In this respect it proved disappointing, but the story of the five Bugis princes who as adventurers and free-lances made their fortunes and attained the highest rank in the smaller kingdoms of Riau, Sambas, Matan and Mĕmpawah, is full of interest, besides throwing sidelights on the history of Kĕdah and other Peninsular countries.

For the shortcomings of the following excerpt I beg to offer several excuses: (*a*) the use of some words of a foreign language, apparently Bugis, not to be found in any dictionary in my possession; (*b*) the constant use of the expressions *ayahanda, bonda, kakanda, adinda, anakanda,* which often make it difficult to determine the real kinship, and last and worst, the Malay way of spelling, in Arabic characters, geographical and proper names. The transcription of the genealogical table of the Bugis princes at the beginning of the book proved to be a hopeless undertaking, my endeavours in the Moluccas, Java and Singapore, to find anybody who could pronounce those names properly, having failed; and for transcriptions given I have to thank Mr. J. Kats, Director of the Institute for Native Languages, Weltevreden, who after a long search succeeded in obtaining a Bugis who could give the correct reading.

The "Silsilah Mĕlayu dan Bugis" is obtainable in the Malay bookshops of Singapore, and as it is illustrated with curious drawings showing the fleet and the sea-fight of Riau, besides a picture of the palace of the Sultan of Riau at the time of his coronation, the purchase of a copy is recommended to collectors of Malay books. Students of Malay customs, etc., will find in the text many more interesting things than could be included in this excerpt without making it unduly long.

SILSILAH MELAYU DAN BUGIS DAN SAKALIAN RAJA-RAJA-NYA.

After the usual praising of God and His Prophet, the author says that in A.H. 1282, on the 15th day of the month Rabi-ul-akhir, he found in his heart the wish to write this Genealogy having obtained a book from the hand of his brother (friend?) Said-al-sharif Abdu'rahman, the son of Said-al-sharif Kasim, Sultan of Pontianak, son of Said-al-sharif Abdu'rahman al-Kadri. Half that book was about the genealogy of Rajas who went away from the Bugis-Island, in search of greatness. And all this the author has written down that knowledge of it may be preserved for his children and grandchildren.

This then is the genealogy of the kings of Mĕmpawah, Pontianak, Matan, Sambas, Riau and Sĕlangor; a *kirbat,* or double bag bound in the middle, one half on the top of the other, containing genealogies both on the spear and distaff sides.

Now the Bugis are descended from a queen of Luwu,[1] who some say descends from Balkis (the queen of Sheba). The author narrates how the Queen of Sheba became Solomon's queen and admits the possibility of their descendants, like many other Arabs, having drifted down to Southern Asia.

1. South-Celebes.

The name of that queen (of Luwu') was Sitti Mĕlangkaé, and she was the queen of the Bugis country Siilang; her son was Datu Palingéi, who begat Patutui, who begat Tebara Koro (Batara Guru?), who begat Batara Lattoé, who begat Sawéri Gading, who begat Lagaligo, who begat Tata' (Patatai), who begat Paduka Saungri-waraû Latalaka, who begat Siajingékorona, who begat Batari Toja (Tonja) mallajang-ngé[1] lepi Bali, who begat To Tenrialaé mallajangngé ulerenna, who begat La Rammapai who died at (*matinru*[2] *ri*) Waraû, who begat La Sessungriû who died at Larappung, who begat Batara Tungké who died at Mallangkaé, who begat La Pannyéoi who departed (*mallopié*) at Ale', who begat La Paddulung who flew aloft at Wowollangi, who begat Sessungriu deceased (*nonnu ri Pérétiwi*[3] who begat Towakkasaû' who died at Usu, who begat Batara Tungké who died at Mallangkaé, who begat Sessungriu who died at Larappung, who begat Towappamadang who died at Nipa, who begat Towélai who died at Tanatekko, who begat Sitti Riwarau who died at Chabatekko, who begat La Wowollangi who died at Langkánanna, who begat Makaramapa who died at Tempetekko, who begat La Mapépulung leppe ri-Matabessi, who begat Tutumui Rapsi tunu sulu chana[4], who begat Toriabusungengngé siallajangngé ri-Langkananna who begat Tenriliung who died at Larukkodona, who begat Tenriumpah who died at Balusué mallajangngé ri-Kalakkanna, who begat Koriallangi who died at Chenrana, who begat La Tenriumpah, who begat Mappaséling who died at Salokona, who begat La Toindah who died at Kananna, who begat La Tenrinyuppa, who begat Lonreng Tellutentreng, who begat La Maddusalat (generally La Maddusila), who was the first to embrace Islam and is the grandson of[5] the Datu of Luwu', also the grandson of the Datu of Soppeng, and also of the Uliah Arung Matiting Pulu. Now La Maddusalat begat Upu[6] Tenriborong Daëng of Lakkai, who had five sons by the same mother, Daëng[7] Parani, Daëng Manambun, Daëng Marioh, Daëng Challa' and Daëng Kamasé.

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1. *mallayang* means "flown in the air", thus dead, (Bug.) used only with sainted princes.

2. *matinru* means "sleeping", thus dead (Bug.), used only with princes.

3. *Pérétiwi* means the bottom of the earth; *nonno*—to go down, *nonnu ri-Pérétiwi*—gone to the bottom of the earth, thus dead.

4. No correct transcription could be got for this name.

5. Could also mean "whose grandson is....." in all three cases.

6. Upu = princely title at Saleier and Palopo.

7. Daëng = title of a descendant of a prince.

Now comes the genealogy of the kings of Mĕmpawah,[1] which enters (that of) the kings of Java, which enters the genealogy of the kings of Sukadana,[1] Matan[1] and Sampang,[1] and also that of Java, called Damar Wulan,[1] who took as wife Ratu Kĕnchana Ungu and begat Bĕrwijaya, who begat (the?) Susunan, who begat the king of Mĕnjapahit, who begat Bĕrwijaya, who became king of Sukadana in the old, old time. He begat Raja Yapurung, who fell ill (through?) doing penance in the water, but recovered and begat Pangeran Karang Tunjung, who begat Pĕnĕmbahan[3] Kalahirang, who was the Pĕnĕmbahan (of) Bĕndala, who begat the Pĕnĕmbahan (of?) Sukadana, who begat two children, a girl named Pĕnĕmbahan Ayer Mala, and a boy named Pĕnĕmbahan Ayer Chaga, who begat the Pĕnĕmbahan of Baroh, who begat the Pĕnĕmbahan Dikiri Kĕsu'ma, who begat Duli Maulana Al-sultan Muhamad Safiyu'd-din, who entered the Mohamedan faith through Shaikh Shamsu'd-din, who brought as presents a small Kora'an and a ring with a red jacinth from Mĕkah. Another son of Pĕnĕmbahan Kiri Kĕsu'ma was Raden Lĕkar, who went to Mĕlio and took as wife Utin Pĕrio,' and he is the ancestor of the kings of the region of the Kapuas-river.

Sultan Muhamad Safiyu'd-din begat Sultan Muhamad Zainu'd-din, a second son Pangeran Agung, and a daughter, Princess Kĕsumba.

Pĕnĕmbahan Dikiri Kasu'ma had also a daughter, Ratu Suria Kĕsu'ma, who was the sister of Sultan Muhamad Safiyu'd-din and married Raja Tĕngah, the son of the king of the country of Brunei, but he lived at Sambas, and Ratu Suria Kĕsu'ma gave birth to a son, Raden Sulaiman, who became king of Sambas under the name of Sultan Muhamad Safiyu'd-din, in order to obtain the blessing (*bĕrkat*) of the name of his uncle at Sukadana.

Sultan Muhamad Zainu'd-din had six children, Princess Kĕsumba, styled Ratu Agung Sĕnuhun, Pangeran Ratu, Sultan Mĕngkurut, Pangeran Agung Martadipura, (princess) Utin Kĕrupas, (princess) Utin Kĕrupis.

Princess Kĕsumba, styled Ratu Agung Sĕnuhun, married the Bugis prince called Upu Daëng Manabun; they had ten children, 5 sons and 5 daughters; (1) Utin Duwaman, who took as husband Ratu Bagus, who was the Raja of Landak, (2) Kĕsti (Gusti?) Jamril, styled Pĕnĕmbahan Adijaya Kesuma Jaya, who became Raja of Mĕmpawah, (3) Kĕsti Jamdin, styled at Sambas Pangeran Chakra, (4) Utin Chĕndĕrasari, who became Queen of Sampang, (5) Kĕsti Chĕlĕri, styled at Mĕmpawah Pangeran Mangku, (6) Ratu Suria Kĕsu'ma, (7) Kĕsti Jĕlĕma, styled at Mĕm-

1. All on the Western side of Borneo.

2. The hero of the Javanese romance "Damar Wulan", text published by the Bat. Gen. v. K. & W. in 1922.

3. A high Javanese title, derived from "Sĕmbah."

pawah Kĕsti Pĕnglima, (8) Utin Chĕndĕra Midi, who became the wife of Sultan Sharif Abdu'r-Rahman, the son of Al-habib Husain Al-kadri, who was called Sĕri Paduka Sultan Sharif Abdu'r-Rahman, Raja of Pontianak, (9) Kĕsti Sina, whose nursery-name was Kĕsti Bĕndara, later styled Pangeran Jaya Putĕra, (10) Utin Tawang, called Utin Busu = *bongsu*, who was married to (the Pangeran (of) Kapur and became first cousin (*sa-pupu sa-kali*) to the Sultan of Brunei.[1]

The second son of Sultan Muhamad Zainu'd-din, named Pangeran Ratu, begat Raden Kĕlĕkuh and Raden Kĕlĕkah, who begat Raden Thalib and Ratu Imam. The latter had six children, Raden Abas, Raden Gandawati, Mas Baudin, Mas Raya, Mas Chĕrih, and Ratu Pĕnĕmbahan; Raden Gandawati begat Raden Johar; Mas Chĕrih begat Abang Bĕkat and Ratu Saidit.

The third son of Sultan Muhamad Zainu'd-din, named Sultan Mĕngkurut, begat Sultan Dirilaya, who begat Sultan Indralaya, which is the name of his place, i.e. his *kampong* at Matan. He begat Sultan Anom, who married Emas Apam, the daughter of Kĕsti Sina, who was styled Pangeran Jaya Putĕra and was the son of the Raja of Mĕmpawah. Emas Apam, who received the title of Ratu Sultan Anom, gave birth to Utin Fatmah, who married Pangeran Sharif Abubakar Pontianak, the son of the late Sultan Sharif Kasim Al-kadri, and gave birth to Sharif Husain bin Pangeran Sharif Abubakar Pontianak Al-kadri.

The second son of Duli Maulana Al-Sultan Muhamad Safiyu'd-din, named Pangeran Agung, had many children, (1) Ratu Mĕlayu, (2) Utin Raki, (3) the third (no name given) became the father of Pangeran Marta of Matan, (4) Raden Sĕkara, called Pangeran Pulu Jambu, (5) Kĕsti Aris, (6) Pangeran Suria, the father of Kĕsti Mĕrĕsal, who was styled Pĕnĕmbahan at Matan, (7) Tia' Rangi, who became the mother of Raden Embong.

Pangeran Agung, second son of Sultan Muhamad Safiyu'd-din, had two sons-in-law, one a Bugis prince, named Daëng Matekko and the other also a Bugis, named Haji Hafidz. The latter was well versed in every science; in battle he would place a metal-vessel before him, filled with water, into which all bullets of the enemy, which should have struck him, dropped. Now Pangeran Agung bore ill-feeling against his elder brother, Sultan Muhamad Zainu'd-din, on account of the kingship. One night he entered the courtyard of his brother's palace, and the king with his family went to Banjar, where he asked the Pĕnĕmbahan of Banjar for troops to regain his kingdom. He was entertained with royal honours, and the men from Mampit, Mĕndawi, and Kota Ringin under Pĕnglima Pĕrang Pantas were

1. See p. 28, where some of the names are spelled differently.

ordered to help him. He further asked the five Bugis princes of Siantan for assistance. He went to Matan, leaving his family at Banjar, but his troops were defeated, Pĕnglima Pĕrang Pantas was killed in the battle, and the king quite alone fled into the mosque of Matan, which he closed from inside. He reminded the people outside of his former kindness to them, and though strictly forbidden by Pangeran Agung, they continued to send food stealthily to their former Sultan in the Mosque.

The Bugis-king of Luwu', La Maddusalat,[1] had three sons, Pajong[2] (also written Pachong), who later ruled over Luwu', Upu Daëng Rilaka, who went to try his luck further West, and Upu Daëng Biasa, who went to make his fortune in Java and Batavia.

Upu Daëng Rilaka went first to Topamana,[3] taking his five sons, all born by the same mother. At Topamana, he married the Queen of that country and begat a daughter, Datu Ruatu, who became the mother of Karaëng Taliba'. When Daëng Rilaka was at Topamana, a buffalo died from eating the shoots of a *simpur* shrub.[4] The herdsman cut down the shrub and found a piece of iron shaped like a *badik* (a small dagger, about 6 inches long), which he took home and forgot. A *dukun* (medicine-man) named Sanro[5] Makka fell into a trance and called out that a present had come from the earth and water of the country for the king, which the herdsman had not delivered. The man was haled before the king; his hut was torn down, and the Sanro, still in his trance, found among its contents the piece of iron, which he presented to the king. The Sanro recovered from his trance, the herdsman was dismissed, and of the piece of iron Upu Daëng Rilaka ordered a *badik* to be made. Some iron remained, and of this was made an artificial spur for a fighting-cock:—when tried on a fowl, the bird died immediately, and its feathers dropped off. The spur was called *Taji Kĕrami*, and is still with the kings of Mĕmpawah and forms part of their royal insignia. For the *badik* a handle was made of cats-horn (*tando' kuching*), and it forms part of the insignia of the Yam tuan Muda of Riau. When the spur was sent to the Bugis-country, nobody there dared to (have his cock) fight against a cock equipped with it, as its destroying power (*bisa*) was well known.

Some time afterwards Daëng Rilaka asked and obtained his wife's permission to visit the Arung[6] of Boni, a cousin of his.

1. See *supra*.
2. Title of the King of Luwu (pajong = payong).
3. تفحا , must be somewhere in the South of Celebes.
4. Colbertia obovata.
5. Sanro = dukun.
6. Arung is a Buginese title = raja.

He was well received, stayed with the Raja, and together with his five sons went with the Raja to Uju Pandan in Mĕngkasar[1] to visit Goa. At Mĕngkasar they entered the walled city of Goa, and the Arung of Boni took a wife there. When after six months the Raja wanted to return, he left Upu Daëng Rilaka behind to guard the city and the royal household, and gave him a *kĕris* named Tanjong (Tunjung) Lada, made of the iron which La Tunru Mĕlĕmpai' Kĕmana had found in the foam of water (*bueh ayer*). The Raja of Boni returned safely and went back into the Kota Rumpai Gading, as the Palace of Boni is called.

Some weeks afterwards Upu Daëng Rilaka, sitting in one of the halls of the palace at Mĕngkasar, saw a man coming out of the kitchen carrying a bundle with betel-leaves. When asked what he was doing, the man ran away, pursued by the five sons of Daëng Rilaka. They met the prince of Mĕngkasar, who was waiting outside the palace-wall; Upu Daëng Parani stabbed him with the *kĕris* Tanjong Lada, and the prince died. There was great excitement, but Upu Daëng Rilaka told the people that he would report the matter to the Arung of Boni, and they asked no more questions. Upu Daëng Rilaka went to Boni with his sons and reported that the prince of Mĕngkasar had been killed by Upu Daëng Parani because he had intrigued with one of the concubines of the Raja of Boni at Mĕngkasar, and the Raja was pleased and praised Upu Daëng Parani for having done his duty.

Not long afterwards Upu Daëng Rilaka asked leave to try his luck further West, and the Raja of Boni reluctantly let him go, asking him not to forget to come back, as the Bugis-country was in an unsettled state, and not to forget his love for his elder brother, Paduka Pajong at Luwu', who was quite alone, as Upu Daëng Biasa had gone away to Java. Upu Daëng Rilaka promised to return. In Mĕngkasar he found a ship sailing westward, and the first night on board Upu Daëng Manambun dreamed that the penis of Upu Daëng Challa stood out into the sea and became a dragon with its head turned to the West. He told his father and brothers of his dream. They sailed to Java, where they heard the Upu Daëng Biasa had been made Major of the Bugis at Batavia by the Dutch Company, as at the time when the Dutch were at war with the Susunan Kuning of Solo, Upu Daëng Biasa had helped the Company, and the Susunan Kuning had to flee with his two children.

Upu Daëng Rilaka and Upu Daëng Biasa met at Batavia, where Upu Daëng Rilaka stayed at his brother's house at Kampong Baru. Three months later he borrowed money of his brother to buy an armed *pĕnchalang* (a big trading- or pirating-vessel) for a cruise (*mĕngĕmbara*) to the country of the Malays (*tanah*

1. Mĕngkasar = Makasar.

*Mĕlayu*). First he came to Siantan, where he stayed with Nakhoda Alang, a Bugis, whose daughter was married to Upu Daëng Parani. Then they went to Malaka, where they heard that Raja Chulan was at Kĕmboja, having come from Mĕnangkabau in his ketch (*kichi*), with a fighting-cock to try and get a cock-fight. The stake was his ship with the full cargo, and he had been to nine countries without finding anybody who dared to accept the challenge:—when his cock beat its wings even the masts of the ship began to shake. Its name was *rumah buro' bĕrtongkat bĕsi, jangankan kalah, sĕri pun tiada, dan pĕrjalanan sa-tahun jadi sa-hari.* ("A tumble-down house propped up with iron, never vanquished, not even matched; a year's journey becomes a day's"). Upu Daëng Rilaka and his sons decided to sail to Kĕmboja and have a trial with Raja Chulan's cock, as they had the "Taji Kĕrami", which was invincible, and the dream of Daëng Manambun. The latter should hold the cock whilst the spur was fastened to its feet, as he was the one who had dreamt, and the owner of the *Taji Kĕrami;* and Daëng Challa should fasten it, as he was the one who had been dreamt of. They would have made twelve chests, each one fathom long, ½ fathom deep and ½ fathom wide, which were to be filled with stones, and fitted with good locks and chains. Asked what they would stake, they would say that they had on board twelve big chests filled with *rial batu* (pieces of silver, stamped, but without fixed shape), dollars and ducats; they would show the chests, but refuse to open them, saying that if they were believed, the fight should take place, but if they should not be believed, it should not come off, as it was the custom of noble Bugis that they would rather die than be put to shame.

They sailed to Kĕmboja and were placed under the care of the harbourmaster. One day the Raja told Upu Daëng Rilaka of Raja Chulan, his cock and the challenge, which nobody would accept. Upu Daëng Rilaka replied that he would stake his twelve treasure-chests and his ship, if the value of his vessel should equal that of Raja Chulan in the opinion of appraisers. If the stake were accepted, the Raja should order the people to bring to the cockpit their fighting-cocks, from which he could hire or buy one to match that of Raja Chulan. The Raja agreed; the harbourmaster was ordered to appraise and compare the value of the ships and their cargoes, and found them fairly equal. The Raja ordered him to arrange everything for the match, to have the rules of the cockpit proclaimed, to take the rudders out of the two ships and keep them under his care, and to instruct the people to bring their fighting-cocks to the cockpit. On the day fixed every one assembled and the Bugis found a cock with gold-flamed feathers, yellow beak, white wattles, and blue feet. The owner asked a price of one *jampal* (½ *tahil* gold), which they paid without bargaining. Each party proclaims their stake, Raja Chulan his ship with her whole cargo and crew (in case of his losing, only he and

his wife were to leave, with nothing but a *sarong* round their loins) and Daëng Rilaka his ship and his twelve treasure-chests, but in case of losing he and his sons and all his followers were to leave the vessel. The Bugis then ask for a postponement of seven days to train (*bĕla*) their bird. Raja Chulan agrees, but demands that the conditions be confirmed before the Raja. The Raja orders his nobles to witness the fight, to prevent people from quarrelling, and to see to it that that there was no throwing down of head-kerchiefs, no beating of the ground with the hands, and no grasping of weapons. Two forked pieces of timber should be prepared, the branches of the fork a span long, for taking up the dead birds.

At the fixed day, at the time of the third afternoon-prayer, the parties meet at the crowded cockpit. The spurs are fastened to the feet of the birds in the style called *bulang sali*,[1] and the Bugis use the Taji Kĕrami. As soon as the fight begins, Raja Chulan's white cock cuts off one wing of the Bugis cock; the bird falls on its side and cannot rise but defends itself with its feet so well that the white cock is unable to touch it. At last the white cock flies 15 fathoms high into the air, its feathers dropping down, and falls down dead. One of the Juara's[2] takes it up and brings it to the Bugis cock, which pecks two or three times at it and is proclaimed winner. The white cock is found to have received only a slight scratch, but its body has turned blue. The Bugis receive the ship and her cargo from Raja Chulan.[3]

Upu Daëng Rilaka returned to Siantan, where a son had been born to Daëng Parani, who is named Daëng Kĕmboja. Raja Chulan's brig is altered into a *Pĕnjajap* (a Malay war-vessel with two masts and gun-shields), and six more ships of the same style are built at Siantan. A daughter is born to Upu Daëng Parani, who receives the name of Daëng Tejah and later became the wife of Raja Aalam of Siak. Upu Tenri Daëng Rilaka died at Siantan, but whether he was burried at Siantan or brought back to the Bugis-country, only God knoweth.

Now follows the story of the Land of the West, which is the country of Johore, and the Malay rajas, who are said to have descended from Alexander the Great.

The first Malay raja at Singapore was called Sĕri Tĕri Buana, and came from Bukit Sĕguntang. He was followed by his son Sĕri Pikrama Wira, who was followed by his son Rakna Wikrama, whose son and heir was Paduka Maharaja, who was followed by his son Raja Iskandar Shah, who left Singapore and founded Malaka, being the fifth raja of his line. There reigned in Malaka this Raja Iskandar Shah for three years, and he was followed by

1. *Bulang* = wrappings to fasten the spur; *sali* and power, strength?
2. Cock-trainer.
3. Compare the story of Raja Chulan in the "Hikayat Hang Tuah", and the story in Chĕrita Jenaka.

his son Sultan Muhamad Shah, who was followed by his son Sultan Mudzafar Shah, who was followed by his son Sultan Mansur Shah, who was followed by his son Sultan Alaudin Shah, who was followed by his son Sultan Mahmud Shah, who installed on the throne his son Sultan Ahmad Shah. The latter abandoned Malaka, being attacked by the Fĕringgi, and went back to Banten, being the sixth of the Rajas of Malaka.[1]

The first Raja of Johore was a son of the above. Sultan Mahmud Shah, called Sultan Alaudin Riayat Shah, who was followed by his son Sultan Mudzafar Shah, who was followed by his brother-in-law Sultan Ali Abdul-jamal, who was followed by his son Sultan Mansur Shah. During the reign of Sultan Mansur Shah a son of Sultan Mudzafar Shah, called Raja Abdullah, had charge of the government (*mĕmangku kĕrajaan*) for Sultan Mansur Shah. From Raja Abdullah the kingdom of Johore and Riau (went to?) Sultan Abdul-jalil, who was followed by his son called Raja Ibrahim. His Bĕndahara (grand-vizier) was Tun Habib, styled Bĕndahara Sĕri Maharaja, who ruled over Riau. Sultan Ibrahim died and was followed by his son Sultan Mahmud, and the Bĕndahara Tun Habib died also. Then Sultan Mahmud died, being killed at Kota Tinggi in the country of Makam Tauhid, and with him ended the line of the Rajas of Malaka, and the kingship went to the line of the Bĕndahara Tun Habib, as it is the custom that if a ruling line dies out, kingship goes to the line of the Bĕndahara, who is of the same lineage. Thus Sultan Mahmud after his death was followed by a son of the Bĕndahara Tun Habib, styled Sultan Abdul-jalil, which was A.H. 1111, in the year Wau, on the 8th day of the month Rabi-ul-awal, on a Thursday morning, at the time of Dzoha (about 10 a.m.).

At that time was born Raja Sulaiman; the Bĕndahara was Tĕmĕnggong Tun Abdullah, who was made Bĕndahara, but other authors say that the Bĕndahara Tun Abdullah was replaced by Tun Husain, the elder brother of Raja Abdul-jalil, who was not made king because he was not an *anak di-dalam* (a child of the raja by one of his four legal wives?) as was Raja Abdul-jalil. Other authors say that Sultan Mahmud died before the Bĕndahara, but God only knoweth the truth.

Now by the will of God Bĕndahara Tun Husain listened to the temptations of the devil and was jealous because he the elder brother had to pay obeisance to the younger, and he sought ways and means to destroy him. And there came to Johore Raja Kĕchi' of Siak, who proposed for the hand of Tĕngku Busu', the youngest daughter of the late Sultan. On the advice of the Bĕndahara his suit was accepted. But slander said that Raja Kĕchi' was not a real son of the Raja, as Ĕnche' Pong (his mother?) had already been pregnant when taken by the late Raja, and there were

1. cf. Sĕjarah Mĕlayu, also as regards the following history of Johore.

many other stories, too, so that the Queens and the family of Tĕngku Busu' became afraid; they made her disappear and kept her in the palace. Raja Kĕchi' was offended and went back to Siak. There-upon the Bĕndahara asked Raja Kĕchi' to attack Johore, and Johore lost the fight, for there was no harmony between the people and the nobles, who had oppressed the people, altered old customs and done much wrong. Johore was destroyed and made a field for turtle-doves, as the saying is.

Now some writers say that when Raja Abdul-jalil, son of the Bĕndahara Tun Habib, was made Raja of Johore, Raja Indra Bongsu was made Raja Muda and Tĕmĕnggong Abdullah was made Bĕndahara to replace Bĕndahara Tun Mas Anom, who had died, and that it was in their time Johore was destroyed, but about that the present author can say nothing.

When Raja Kĕchi' attacked Raja Abdul-jalil at Johore, Upu Daëng Parani and his brothers had already sailed to Langat (Langkat?), according to the chronicle of Siak, but that chronicle differs much as regards dates from those of the West and Johore, since the betrothal of Tĕngku Tĕngah with Upu Daëng Parani must have taken place after Raja Sulaiman had been installed raja by the Bugis princes, and all the brothers of Upu Daëng Parani had been married by Raja Sulaiman to his sisters and relations. But the present author is unable to say which record is right, as all these events happened a hundred years before his time.

(A long *shaër* here narrates the fall of Johore. The Raja Muda plays chess in the audience-hall, when the news of the enemy's attack is brought, but does not abandon his game until the enemy is under the walls of the city. The people of Johore fight weakly, and the Raja Muda sees that everything is lost. He runs *amok* in the palace, killing his wives and concubines, and rushes against the enemy, whom he drives back to the Maidan outside the city. Raja Kĕchi' rallies his troops, and by their fire the Raja Muda and his followers are killed. The Bĕndahara assembles what is left of the royal family and brings them, including the "second" raja, Abdul-jalil, and Tĕngku Busu, to Kuala Pahang. Johore is laid waste; the dead Raja Muda is buried there).

Sultan Abdul-jalil having fled to Pahang, Raja Kĕchi' orders his Laksamana,[1] Nakhoda Sĕkam, to pursue him. Several times Sultan Abdul-jalil is defeated, and at last the Laksamana invites him in the name of Raja Kĕchi' to go to Riau. The Sultan accepts the offer, and with his family goes on board one of the Laksamana's ships, Tun Narawangsa following in another. A messenger from Riau arrives with a letter from Raja Kĕchi' ordering the Laksamana to kill the Sultan. Nakhoda Sĕkam, who

1. Title of the admiral of the Malay fleet.

had promised the Sultan to bring him safely to Riau, is disgusted at this change of policy, but has no choice except to follow Raja Kĕchi's command; he sends four of his warriors in coats of mail over to the Sultan's ship to run amok, and the Sultan and Tun Narawangsa are killed, the Sultan being buried at Kuala Pahang in Tĕlok Kandang. This happened A.H. 1133.

Other chronicles from the West report that Raja Kĕchi' was present at the attack, and that Sultan Abdul-jalil was killed on his prayer-mat. In the cabin were Tĕngku Busu, the betrothed of Raja Kĕchi' of Siak, Tĕngku Tĕngah, Raja Sulaiman, Raja Abdul-Rahman, five daughters of the Sultan, a son of Sultan Marhum yang mangkat di-Kayu, Raja Muhamad, and seven women. Some say that princess Tĕngku Tĕngah ran amok, and the men from Mĕnangkabau ran away, as they did not want to fight her, but came back and captured Tĕngku Tĕngah and Raja Sulaiman, bound their hands behind their backs and robbed Raja Sulaiman of his anklets, which, though a big boy, he still wore. Raja Kĕchi' came on board the vessel, found his wife (betrothed) Tĕngku Busu in the cabin, and released Tĕngku Tĕngah and Raja Sulaiman. Raja Kĕchi' went back to Riau, where he proclaimed himself Raja. The captured princes were made servants in his palaces; others say that he built a separate palace for them. Six months later the Bugis princes came and took away Riau from Raja Kĕchi'.

(The author inserts advice regarding the transience of earthly greatness, and adds a *shaër*).

Now the Bĕndahara wanted to be made Raja of Riau, as Raja Kĕchi' was to return to Siak, but his wish was not granted, so he conspired with Raja Sulaiman and sent a letter to the Bugis princes asking their assistance to take away the crown of Johore from the Mĕnangkabau prince. They were the five sons of Upu Tenri Burong Daëng Rilaka, prince of Luwu', brother (cousin) to the Raja of Boni. The name of the Raja of Luwu' was La Maddusalat, and the five Upus were his grandsons. When the letter came, they were ready for the adventure, and so these princes made war against Riau, Siak, and Kĕdah. Their names were Upu Daëng Parani, Upu Daëng Manambun, Upu Daëng Marioh, Upu Daëng Challa called in the West Upu Daëng Pali, and Upu Daëng Kamase. Upu Daëng Manambun became Raja of Mĕmpawah with the title Pangeran Emas Suria Nĕgara, Upu Daëng Marioh became Yamtuan Muda of Riau with title of Kĕlana Jaya Putĕra; he died in Riau and was called *Marhum mangkat di-Sungai Baharu.* Upu Daëng Challa became the second Yamtuan Muda of Riau; after his death he was known as *Marhum Mangkat di-Kota;* he was the father of Marhum Tĕluk Kĕtapang and his brothers; Marhum Telok Kĕtapang was the father of the Yamtuan Muda Raja Jafar and his brothers, and his grandchildren and further descendants were the rulers of Riau. *Marhum mangkat di-Kota* married Raja Mĕlayu, the sister of Marhum Sulaiman. The

latter was the father of Marhum Abdul-jalil, who married Tĕngku Puteh, the daughter of *Marhum Mangkat di-Kota* with the sister of Marhum Sultan Sulaiman. Marhum Abdul-jalil was the father of Marhum Mahmud, the latter the father of Marhum Abdu'rahman. The Yamtuan Bĕsar of Riau and Lingga are the descendants of the Bugis on the mother's side. Upu Daëng Kamasé received the title of Pangeran Mangkubumi in Sambas, as will be narrated later.

A messenger from Sultan Muhamad Zainu'd-din of Matan came to Siantan to ask the assistance of Upu Daëng Parani, the eldest of the Bugis princes, who at that time lived there. After consulting his brothers, Upu Daëng Parani promised his assistance, and the five brothers sailed for Matan, each on his own Penjajab They came to Sampang, where they were told that Sultan Muhamad Zainu'd-din had received assistance from the Raja of Banjar and was attacking Matan. The Bugis sailed for Matan, arrived at the Pawan-branch of the Matan-river and landed at the landing-stage of the Pĕnĕmbahan Agung. They asked to see the Pĕnĕmbahan Agung, Daëng Metekko and Haji Hafidz, and the Datu Bandar (harbourmaster) brought them to see Pĕnĕmbahan Agung, who told them that Sultan Muhamad Zainu'd-din had been shut in the mosque for about five months, but was quite well. They asked that the Sultan be released, but the Pĕnĕmbahan declined, and they went to the Mosque. They made themselves known to the Sultan, and he let them into the mosque, where they decided to bring the Sultan to the Pĕnĕmbahan, and should the latter decline to receive them, to sail away. The Pĕnĕmbahan banishes them from Matan. They sail to Banjar, taking the Sultan with them, where he meets the Sultan of Banjar and tells his story. The Sultan of Banjar informs him that several times the Pĕnĕmbahan Agung had sent a messenger to fetch Ratu Sultan Emas Indrawati (later called Darwarti), Sultan Muhamad Zainu'd-din's wife, and his children to Matan, but that he had told the messenger that he himself would shortly come with arms to look after Sultan Muhamad Zainu'd-din. The latter asks to be allowed to take back to Matan his family and his followers, as far as they had not married there and wanted to follow him. With them and the five Bugis princes he sails to Matan and stops at Kuala Kandang Kĕrbau, where the women and children go ashore to bathe. They are the wife of the Sultan, Ratu Emas Darwati, daughter of Pĕnĕmbahan of Singkawu', and her daughter Princess Kĕsumba, further Njai Gandi, the daughter of Yakĕriu, who met with Lilat Al-kadir, and whom Sultan Muhamad Zainu'd-din made his wife, with her two sons Pangeran Ratu and Pangeran Mĕngkurut, who later became Sultan Mĕngkurut of Matan, and also the two daughters of Sultan Muhamad Zainu'd-din by another wife, Utin

Kĕrupas and Utin Kĕrupis, and Pangeran Agung Martadipura.[1] Upu Daëng Manambun sees princess Kĕsumba and falls in love with her. A small hut is built for the Sultan, where he receives the Bugis princes and informs them that he wishes to marry his three daughters to three of them. They ask permission to consider the matter and retire to their ships; Upu Daëng Parani has already wife and children; Upu Daëng Manambun wants princess Kĕsumba, but the others will not yet marry, as they want to go to Riau to help Raja Sulaiman, and besides, the other daughters of the Sultan are still very young. They will see Upu Daëng Manambun married, and will then sail to Riau leaving him at Matan, but he insists upon accompanying his brothers to Riau after his marriage. The Sultan agrees. On the 13th day of the month the bridegroom is carried in procession to the Sultan's courtyard, and the two are married according to royal rites. On the third day afterwards the bathing water is brought in procession, and the couple take the royal ceremonial bath.

The Bugis sail up the Batangan Pawan and reach Matan. The Pĕnĕmbahan sends his Bugis sons-in-law, Daëng Matekko and Haji Hafidz, to meet them. When the two parties meet, they shake hands, the other hand on the handle of the *kĕris*. They don't want to fight: the Haji is afraid that if anything happens, his family in Celebes will suffer, as the five Upus are related to nearly all the princes there, and Daëng Matekko is related to the five brothers. But Pĕnĕmbahan Agung has bidden them prevent the five brothers from entering the town, either by persuasion or force. On the Haji's advice Daëng Matekko takes one of the ships of the brothers, their people going ashore with all there is in the ship, including one of the pair of cannons called Si Gĕndah, and sails to Siak. Up to the present day one of the cannons is in Siak in the possession of the descendants of Daëng Matekko and the other is in Mĕmpawah with the descendants of Daëng Manambun.

The five brothers enter the town, capture the Pĕnĕmbahan Agung without bloodshed and bring him to Kuala Kandang Kĕrbau to Sultan Muhamad Zainu'd-din, who grants them for their services free entrance into the whole country of Sukadana. As his sons are still young, he looks to the husband of Princess Kĕsumba as his successor. Daëng Parani answers that they have to go to Riau to help Raja Sulaiman and desire to take Daëng Manambun with them, which the Sultan grants. A small fort is built as prison for Pangeran Agung, wherein he is shut with thirty girl-servants; it has a channel as gutter leading to the river. A Mĕntĕri is appointed to watch over them. The Pĕnĕmbahan Agung takes the thirty girls as concubines, and that is the reason why there are so many children of his. He lived in that fort until his death.

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1. cf. p. 3.

The five brothers take leave of the Sultan and sail for Riau; with them are Daëng Manampu; Daëng Mĕsuru,[1] Daeng Mĕnĕtu,[1] and a *pĕnggawa* (military officer) called Taskuni. They have seven large ships armed with guns, and a *sĕkochi* (yacht) which is altered to carry big guns. The fleet of Raja Kĕchi' meets them, is defeated and flees to Pulau Bayan, where the fight is renewed. The Bugis build a stockade at Tanjong Pinang, and more fighting ensues there, until the men of Siak are utterly defeated. Raja Kĕchi', who had stayed in the stockade at Pulau Bayan, flees to Lingga and further. This happened A. H. 1134.

The Bugis then sail to Riau and capture many Malays; the inhabitants of the Raja's palace they keep in the fort, which is not demolished. At Riau they meet Raja Sulaiman.

(Here a long *shaër* is inserted, describing the fight, the preparing of the presents (*pĕrsalinan*) in the palace of Raja Sulaiman by his aunt and his two sisters, the subsequent return of Raja Kĕchi' to Riau, Raja Sulaiman's flight to Pahang, the Bugis princes being at that time at Sĕlangor, the defeat of Raja Kĕchi' at Lingga, and the return of Raja Sulaiman and the Bugis princes to Riau.)

Raja Sulaiman narrates how Raja Kĕchi' had carried off all the treasures and royal insignia of Riau to Siak, had forced him to go there once a year to do homage had taken by force his sister, Tĕngku Kamariah, as his wife, and had a son by her, Tĕngku Muhamad Sultan, called in his infancy Yamtuan Raja Buang. The Bugis stipulate that if they go to Siak and make Raja Sulaiman Yamtuan Bĕsar, and the kingdom hereditary in his family, one of the five brothers shall be made Yamtuan Muda, which office shall also be hereditary in his family, and the Yamtuan Bĕsar shall be like the wife, "*jika di-bĕri makan, maka baharu-lah makan ia*" (if she is given food, then only she eats), whilst the Yamtuan Muda shall be the husband, his decision to be followed in all matters. Raja Sulaiman agrees, and the Bugis *mĕngaruk*, (i.e. swear allegiance executing a war-dance, wherein the words "*aku*" and "*ĕngkau*" are used in addressing the prince.)

They go to Sĕlangor, to recruit more Bugis and to build a fleet there, as the war with Raja Kĕchi' will be a long one. At Sĕlangor they prepare a fleet of thirty vessels. Some say that Raja Sulaiman went to Pahang to visit his uncle (*ayah saudara-nya*) Bĕdahara Peko'. Some other Bugis attacked Raja Kĕchi' at Lingga; he fled to Riau and captured there a trading-vessel (*pĕdewakan*). He stayed at Riau and prepared a fleet. The other Bugis, not knowing the way through the islands, did not pursue him when he fled from Lingga, but went to Sĕlangor to join the five brothers.

1. No-transcription given.

When the latter had their fleet prepared, they had already received news that Raja Kĕchi' had returned to Riau fortified the place and was preparing to meet them. They decided to attack Lingga, a stronghold of Raja Kĕchi', and quickly defeated the headman (*Pĕnghulu*) there, who sent a letter asking Raja Kĕchi' to come to his assistance. Raja Kĕchi' sailed to Lingga, built a stockade opposite that of the Bugis, and anchored his fleet opposite theirs. Fighting commenced between the stockades and the fleets, and the Bugis decide upon the following plan. Their fleet should slowly retreat to the mouth of the river, to make the Siak-people pursue them, and in the night three of the brothers with twenty ships should sail to Riau. When Raja Kĕchi' should also leave his stockade, the remaining Bugis should attack Lingga, as no doubt the people of Lingga would lose heart when their Raja had left. This plan is carried out. Twenty of the Bugis ships drift slowly down the river, pursued by order of Raja Kĕchi', and fight their pursuers until they reach the mouth. The Siak-fleet anchors when it is too dark to fight. Raja Kĕchi' thinks himself victorious and hopes to finish the remaining ten vessels and the Bugis in the stockade on the following morning. But early in the morning his fleet returns and informs him that the twenty vessels had sailed for Riau, leaving behind a message that everybody who had wife and children at Riau had better come and fight for them. Raja Kĕchi' holds a council of war asking whether they should follow to Riau, remain in Lingga or return to Siak. His *mĕntĕri* think that if they attack the Bugis at Riau the latter would kill the family of Raja Kĕchi', whether he wins the fight or not. Whilst they are deliberating, the Bugis attack them, and Raja Kĕchi' decides to return to Siak and inform his household at Riau by secret letter of his doings, as the Bugis were sure to have an understanding with Raja Sulaiman and the Bĕndahara Peko' of Pahang, and so be very strong. He sails to Siak, brings Bandar Bukit Batu over to Tapung Kanan and builds a new town, which is called Dabu' Intan (?; the text reads; *maka Bandar Bukit Batu lari ia itu ka-Tapung Kanan dan baginda pun mĕngĕrah sĕgala orang-orang Sia' mĕmbuat nĕgĕri Dabu' Intan namanya*).

The people of Lingga, after their prince had left surrender to the two Bugis princes.

The three brothers who have sailed to Riau meet Raja Sulaiman coming from Pahang. They enter Riau at night-time, take possession and renew their alliance and their promise to get back from Siak the royal insignia and treasures. A joint fleet of Bugis and Riau people is equipped and sails to Siak, where the people prepare to fight them, but the gun Lela Majnun, which was stolen from Riau, refuses to go off.

The Bugis in Siak join the five princes, the town is taken and Raja Kĕchi' with his household flees upstream. At Sinapalan

he leaves the river and flees over land, always fighting his pursuers, who attack more and more furiously, killing many of his followers and lastly forcing him to abandon everything he carries with him and to save his life, by fleeing into the jungle where they could not pursue him. The royal insignia and treasures of Riau were recovered.

(Here a long *shaër* narrates the above events, the return of the brothers to Riau, their meeting with Raja Sulaiman, and the behaviour of the ladies of the palace. Tun Tifah, Raja Sulaiman's aunt, the sister of the Sultan murdered at Kuala Pahang, suggests that the princes who have risked their lives, should be welcomed by scattering saffron-coloured rice before them and giving them *bĕdak* and *langir*[1], the ingredients for the ceremonial bath, teasing the two young princesses, Tĕngku Tĕngah and Tĕngku Mondok, that it was to fulfil their vows for the safe return of the younger princes. An old (*pĕnghulu istana*) lady of ceremonies scatters the yellow rice before the princess. On Upu Daëng Parani's advice the princesses are presented with two valuable rings from Batavia, which Raja Sulaiman brings to his sisters, and many jokes are made about it by the ladies of the palace. The Bugis princes are given a separate palace).

To fulfil the agreement, Raja Sulaiman asks the five Bugis princes to choose from their number the Yamtuan Muda. They retire and discuss the matter but as they all have the same claim, they ask Raja Sulaiman to choose in accordance with the wishes of the people of Riau. He chooses Upu Daëng Parani, but the latter declines for himself and for Upu Daëng Manambun, who has become the son-in-law of the Sultan of Matan and will settle there. Raja Sulaiman then chooses Upu Daëng Marioh to be Yamtuan Muda, and Upu Daëng Challa as husband for his sister Tĕngku Puan, called Tĕngku Mondok.

Raja Sulaiman then informs his household that Upu Daëng Marioh is to be Yamtuan Muda to govern Johore and Riau, and that he wishes Tĕngku Tĕngah to be married to Upu Daëng Parani and Tĕngku Puan to Upu Daëng Challa. 'Tĕngku Tĕngah shall govern the Istana together with his aunt Tun Tifah; for Tĕngku Kamariah, the wife of Raja Kĕchi', is not suited to govern the royal household owing to her marriage. The Bĕndahara agrees with the plans, so does the Tĕmĕnggong. Tun Tifah is to be married to Upu Daëng Manampu', Daëng Mĕsuru to princess Tun Kĕchi', the youngest daughter of the late Sultan Muda (of Johore?), and Daëng Mĕnĕtu to Tun Inah, another daughter of the late Sultan Muda. Authors from the West say that all these princes were married before Upu Daëng Challa, whilst the authors of the East assert that he married before the others. The *shaër* below is taken from books from the East.

1. *Bĕdak* = a cosmetic powder; *langir* = material used as soap.

Upu Daëng Challa is given a place in the palace, and the Bĕndahara begins the festivities. Sixteen guns are fired every afternoon and at the time of morning-prayer, and the royal kettledrum is sounded seven times every morning and evening. The people assemble, and all sorts of amusements are provided. The Bĕndahara enters the palace, takes his seat on the steps of the middle-door and invites the old royal ladies and the *pĕnghulu istana* to arrange everything for the marriage. Sixteen young girls bring the "*Kain Dukung*" (a square cloth of yellow silk, worn over the shoulder) to bride and bridegroom, who have to change clothes three times a day. The old ladies of the palace adorn bride and groom and all kinds of games are played inside and outside the palace. Seven days and seven nights the festivities last; on the afternoon of the seventh day all the princes are invited into the palace, and the people assemble outside. Upu Daëng Marioh is clad in royal garments and brought to the audience-hall, where Raja Sulaiman is seated on the throne. Upu Daëng Marioh then *mĕngaruk* before Raja Sulaiman, saying in Bugis translated in the text into Malay *Lihat-lah Raja Sulaiman, aku-lah yang mĕnjadi Raja Muda akan mangkui mĕmangku kĕrajaan Raja Sulaiman, yang boleh kuasa yang mĕlintang kubujurkan, dan yang bujur ku-lintangkan, dan yang sĕmak bĕrduri aku chuchikan sa-boleh-boleh-nya.*" "Look, Raja Sulaiman, it is I who am now Raja Muda, in whose hands lies the management of the government of Raja Sulaiman, and who have the power to put lengthwise what is athwart, and to put athwart what is lengthwise, and where, there are bushes and thorns, to clear the place with all my might." His brothers swear allegiance to him, and the other Bugis follow suit.

The five brothers proclaim Raja Sulaiman as Sultan Sulaiman Badar-al-aalam Shah, Raja of Johore, Pahang, Riau and Dependencies. The Bĕndahara, Tĕmĕnggong and Indra Bongsu do homage to His Majesty. The covenant between the Malays and the Bugis is proclaimed and sworn to on the Kora'an. The Bĕndahara then brings the Raja Muda into the palace to partake of the ceremonial rice, sixteen guns are fired, and the royal kettledrum is sounded.

Three days later Upu Daëng Challa is married to Tĕngku Mondok. He is carried in procession round the fort and to the audience-hall, where the Bĕndahara and the other princes greet him and bring him into the palace. Sultan Sulaiman places him at the right of the bride, and himself adorns him with the *pancha bichara*, (a golden branch placed behind the ear of bride or bridegroom), and the royal ladies feed them with the ceremonial rice, whereupon they are taken to the bridal chamber. In the audience-hall the Sultan attends a banquet, whilst in the palace music plays and ladies sing pantuns about the young couple, who are visited by Tun Tifah. Seven days later the young

couple take the bath of peace-making (*bĕrsiram damai*) according to royal custom. A banquet in the audience-hall for the princes, and in the palace for the royal ladies, concludes the festivities.

(A long *shaër* is inserted here, narrating again the marriage).

Upu Daëng Parani is marrid to Tun Erang (Tĕngku Tĕngah), the eldest of the two sisters of the Sultan, and Daëng Manampu' to Tun Tifah, the sister of the late Sultan Abdul-jalil who died at Kuala Pahang. Tun Kĕchi', a daughter of the Marhum Muda, is married to Daëng Mĕsuru, and a sister of the Marhum Muda, Tun Inah, to Daëng Mĕnĕtu'. Of his family Sultan Sulaiman was the eldest; his younger brother was Sultan Abdul-karim, in some chronicles called Sultan Abdul-rahman; the third was Tĕngku Tĕngah; the fourth Tĕngku Puan, for her stature called Tĕngku Mondok; and the fifth was Tĕngku Kamariah, whom Raja Kĕchi' had taken as wife.

When all festivities were over, Upu Daëng Parani asked leave to go to Sĕlangor, and Sultan Sulaiman advised him to marry the daughter of the Yamtuan of Sĕlangor. Together with Upu Daëng Manambun and Upu Daëng Kamasé he sailed to Sĕlangor, married the daughter of the Yamtuan and had a daughter with her.

A letter from the eldest prince of Kĕdah asks the five brothers to assist him in his quarrel with his younger brother over the kingship. Upu Daëng Parani replies that he wants to consult his brothers first, and sails to Riau. The Sultan of Riau would join them but the brothers decided that they will go by themselves first and will see if the cause of the prince of Kĕdah is just. They sail to Kĕdah and meet the prince who had asked for their assistance against his younger brother, who had been made Yamtuan. He promises them fifteen *bahara ringgit*[1] and Upu Daëng Parani accepts on the condition that all the people from the East, *i.e.* the Bugis from Makasar, Mandar &c. are placed under his command. On the third day the five brothers, followed by all the Bugis, march armed to the town and into the audience-hall of the prince, who awaits them with all his people.. Upu Daëng Parani proclaims the prince to be Yamtuan to replace his father, being the eldest of the family. The proclamation (*surat pĕngĕlaran*) is read, guns are fired, and the Bugis swear allegiance according to their custon. A banquet is held, prayers are read, and the people are dismissed, being told to be on their guard. As soon as the news reaches the other Yamtuan, fighting ensues, the new Yamtuan's side being reinforced by people taking up his cause. When fighting has lasted for a month, the five brothers lead a fierce attack, and the people of the former Yamtuan

1. *Bahara* is a certain weight differing in the different countries and according to the merchandise it is used for. As gold-weight a *bahara* equals 10 katis, and the word is probably used here in this meaning, as the Dollars (*ringgit*) hardly had a standard-value at that time and were weighed and not counted.

flee, pursued by the Bugis. The former Yamtuan is utterly defeated, and the Bugis enter his courtyard and take big booty. This all comes from the attack having been led by the five princes in person, as every army whose leader is brave is sure to win, and the five Upus were accustomed to take part in the fight themselves, and their vigour and bravery is renowned up to the present day.

(Here again a *shaër* is inserted describing the fight).

The Bugis inform the Yamtuan of the victory, and he thanks them and presents them with the booty. He marries Upu Daëng Parani to his younger sister. When a daughter has been born to him, Upu Daëng Parani asks leave to return to Riau. The Yamtuan agrees, pays him three *"bahara ringgit,"* and promises to pay the remainder later. The money Upu Daëng Parani distributes amongst the Bugis who have helped him and returns with his brothers to Riau. Upu Daëng Mariok, the Yamtuan Muda, returns to the house of the Tĕmĕnggong, having taken as wife the latter's daughter, Engku Inche Ayu. She awaits him at the palace door saffron-coloured rice is scattered over him, he is given *langir* and *bĕdak* for the ritual bath, and only after that is food brought to him, that being the royal custom on the Yamtuan Muda's return from war. Inche Ayu gave birth to Lampau Unu', whose nursery-name was Inche Unu', of great fame, and to Engku Raja Fatmah, famous for her courage and her long breasts, which when suckling her child she put over her shoulders; this was the great *tuah*[1] of hers. Another daughter was Engku Puan, who gave birth to the Tĕngku Muda of Riau. Raja Fatmah married a son of Upu Daëng Parani called Daëng Kĕmboja, a famous warrior who also became Yamtuan Muda of Riau, later known as *Marhum Janggut*. He begat the Yamtuan Muda Raja Ali of Riau, another son Raja Abdu's-samad, and many more sons and daughters.

Upu Daëng Challa, who later became also Yamtuan Muda of Riau, returned to the palace of Sultan Sulaiman, where he was still living. He was welcomed by his wife Tĕngku Puan, who scattered saffron-coloured rice over him, bathed him with *bĕdak* and *langir*, and had a new suit of clothes brought to him on a silver-tray; and then only they had their meal together. Tĕngku Puan gave birth of Tĕngku Puteh, married to Sultan Abdul-jalil, who after his death was known as *Marhum mangkat di-baroh nĕgĕri Riau*, and who begat the Baginda of Lingga. It was Tĕngku Puteh who was the mother of Sultan Mahmud, Yamtuan Bĕsar of Lingga. Another daughter of hers was Tĕngku Hitam, who ? (*ia-itu-lah jadi bonda-nya oleh istĕri-nya Sayid Kuning*

1. *Tuah* is the personal luck ensuring success to a person in every enterprise, and sometimes attributed to some peculiarity of the body, as in this case. But also weapons, f.i. a kĕris, or animals. f.i. a fighting-cock, have their particular "tuah" which attends the temporary owner.

*nama-nya Sharifah Halimah di-Riau dan nama-nya tuan Sayid Muhamad Zain*). Another son of hers was Raja Haji, also a Yamtuan Muda of Riau, later known as *Marhum Mangkat di-Tĕlok Kĕtapang*, who fell in the holy war against the Dutch from Malaka, and was very famous. Another daughter of hers, Raja Halimah, married the Sultan of Jambi, and another, Raja Aminah, married Arung Lĕnga, the son of a Bugis prince.

Yamtuan Raja Haji (*Marhum mangkat di-Tĕlok Kĕtapang*) begat Tĕngku Bĕsar, Tĕngku Putĕri, the Yamtuan Muda of Riau Raja Ja'afar, Raja Idris, Raja Ahmad, Raja Pahang, Raja Buntit and Engku Puan (of) Sĕlangor. Raja Buntit was married to Raja Sulaiman, the son of Raja Aminah and Arung Lĕnga. Another daughter of Raja Haji was Raja Pasir who married the Yamtuan of Hindala Kiri. Another child of Raja Haji was Raja Amtah.

Engku Puan of Sĕlangor married Sultan Ibrahim, Raja of Sĕlangor, the son of Marhum Salleh, and a relation (*saudara*) of Marhum Raja Haji.

Upu Daëng Manambun had with Princess Kĕsumba ten children, five sons and five daughters:

1. the eldest a daughter, Utin Duwaman, married the Raja of Landak, who received the title of Ratu Bagus; they had four children, Utin Niat, Utin Sadit, who was the mother of the first Pĕnĕmbahan of Landak, Pangeran Suta and Utin Sĕlamat;

2. a son, Gusti Jamril, with the title of Pĕnĕmbahan Adiwijaya Kĕsuma Jaya, who became Raja of Mĕmpawah and had seven sons and two daughters, Gusti Emas, Gusti Jati who received the title Sultan Muhamad Zainu'l-Abidin, Utin Ratnadi, Ĕmas Jurita with the title of Pangeran Muda Jaya Kĕsuma Jaya, (fifth and sixth missing), Ĕmas Jauhar, Gusti Johan, styled Pangeran Pĕrabu Anom, and Gusti Amir, styled Pangeran Omar Kamaru'd-din Adinata Kĕrma;

3. a son Gusti Jamadin, who at Sambas received the title of Pangeran Chakra and had two children, Utin Chia, who married the Pangeran Bĕndahara of Sambas, and Gusti Potik, who received the title of Pangeran Suma Nĕgara;

4. a daughter, Chĕndĕra Sari, with the title of Ratu Sampang;

5. a son, Gusti Jĕlĕri, who at Mĕmpawah received the title of Pangeran Mangku and had seven children, Gusti Urip, Utin Darwati, Gusti Ismail, styled Pangeran Dipati Mangku Nĕgara, Gusti Kasim with the same title of Pangeran Dipati Mangku Nĕgara, Utin Bilalang, Utin Fatmah and Utin Samping;

6. a daughter, Ratu Suria Kĕsuma;

7. a son Gusti Jĕlĕma, with the title of Gusti Pĕnglima, who had two daughters, Utin Ratna Sari with the title of Ratu Suta, and Ratna Wilis;

8. a daughter, Utin Chĕndĕra Midi, with the title of Ratu Sultan Pontianak, who married Sultan Sharif Abdu-rahman ibn Al-Habib Al-Husain Al-Kadĕri, and had two children, a son Sultan Sharif Kasim, and a daughter Utin Sharif Aisah, who married Sharif Shaikh bin Hamid Baabud;

9. a son, Gusti Sina, with the title of Pangeran Jaya Putĕra, who had three daughters, Tĕngku Utin Sĕlamat Kataruwai, who became the wife of Marhum Raja Ali, who died at Pulau Bayan when he sailed to Mĕmpawah and left a son, named Gusti Husain; Ĕmas Apam, styled Ratu Sultan at Matan, and Ĕmas Sĕni;

10. a daughter, Utin Tawang, also called Utin Busu, who married Pangeran Ghafur and became cousin (*sa-pupu sa-kali*) to the Sultan of Brunei. She had a son, Gusti Potil.

A.H. 1136 the five Upus and Daëng Mĕnĕmpu' received the news that Raja Kĕchi of Siak had gone to Kĕdah, called thither by the younger prince to help him fight his elder brother. The Bugis decide to attack Raja Kĕchi' at Kĕdah, as he is sure to molest Riau again, should be win in Kĕdah. Besides, they are bound by their promise to help the eldest prince of Kĕdah. Sultan Sulaiman agreeing, they fit out a fleet of sixty Pĕnjajabs which can carry big guns, the bows being seven ells wide. When Upu Daëng Parani takes leave of his wife, he asks her to forgive him all his faults against her, to pray for him and not to forget him, and crying she bids him farewell. When the (three?) brothers (Upu Daëng Parani, the Yamtuan Muda and Upu Daëng Challa?) take leave of Sultan Sulaiman, they ask him to take good care of his country and to keep it in a state of war according to Bugis custom, as the enemy they are about to attack may just as well come to attack them at Riau. The fleet sails with music playing, accompanied by many boats to the mouth of the river.

When Raja Kĕchi' had come to Kĕdah, the ousted prince had asked him to help him against his elder brother. Raja Kĕchi' promises his assistance; as the Bugis always prefer a furious attack in closed ranks to fighting in single parties, they should build a great number of stockades, into which they could retire and with cannons and swivelguns could meet their attack with matchlocks and carbines. The prince of Kĕdah agrees, and forts and stockades are built on every Tanjong[1] and in every village belonging to the younger prince, all heavily armed; one large fort Raja Kĕchi' builds for himself and his followers, from which he controls the other forts and stockades. He is married to a sister of the wife of Upu Daëng Parani with all royal ceremonies.

1. *Tanjong* is a cape or promontory, but is also used for the inner shore of the winding of a river.

The fleet from Riau arrives. The elder prince meets the brothers and complains about the plotting of his younger brother and Raja Kĕchi'. The Bugis try if the matter can be settled without bloodshed, and a letter is written suggesting that the princes of Kĕdah should make peace to the benefit of themselves, and the welfare of the country. Raja Kĕchi' opens and reads the letter in the presence of the younger prince and gives an angry answer to the messenger, declining to listen to the proposal, refusing to send a letter in return and bidding him ask the Bugis, why they had come, if they were afraid to eat Kedah oranges? The messenger leaves without paying obeisance to the princes, tells the Bugis his news, and on the following day fighting begins, mainly with fire-arms between the fleet and the stockades, now stopping for a few days and then beginning again. After a few months the trade of Kĕdah is ruined, and the only commerce is in munitions. According to the Annals of Siak the war dragged on for two years. The inhabitants of Kedah were disgusted and both parties agreed not to use ball when ordered to fire at each other. At last Upu Daëng Parani wrote a letter to Raja Kĕchi', urging him to a fight man against man, as the war had already lasted so long that they had both begat a child, and would last another ten years if carried on as hitherto. Raja Kĕchi' was afraid of meeting Upu Daëng Parani in single combat and thought of a ruse. He accepted, the challenge; Upu Daëng Parani sailed his ship further up the river and built a stockade opposite that of Raja Kĕchi'. The next day both parties sally out; the Menangkabaus are defeated and retire into the fort, where the guns begin to play. The Bugis lie down and with their carbines pick off the gunners. Enche Yahya, a follower of Raja Kĕchi' from Makassar, offers to fight the Bugis in the field, but flees when he sees that they are clad in chain-armour. Raja Kĕchi' orders him to surprise the Bugis in the fort, Enche Yahya succeeds in opening the port of the fort and with his followers runs *amok* amongst the sleeping Bugis. Pĕnglima Yahya meets a Bugis party of the Bugis outer guard coming to the rescue and runs back into the stockade, hoping to be able to scale the flat side (*pĕnampang*) of it, but he is hit with the butt-end of a carbine and falls down outside. Bleeding he reaches his own fort and swoons. Some of his followers caught in the Bugis fort are beheaded and their heads are put on stakes on the battlefield. Soon afterwards Upu Daëng Parani attacks the fort of Raja Kĕchi', succeeds in storming it, and the Mĕnangkabaus flee. Raja Kĕchi' throws himself into the ditch and tries to get away in the high reedgrass, accompanied by his Pĕnglima Dalam. They are both wounded by the lances of the Bugis, but succeed in reaching the other side of the ditch and one of their stockades there. Raja Kĕchi' gives order to retake the fort just captured by the Bugis during the night, as he is put to great shame, his headkerchief being left behind; whosoever would bring him his head-kerchief, should be raised to the rank of an Orang

Bĕsar. Now the Upus had quitted the fort in order to bring their ships further up the river, and the other Bugis, who had been left behind to guard the fort, fell asleep, tired by the fighting. Just before daybreak Enche Yahya gets in unobserved, and an *amok* begins. The Siak-people take the fort and find Raja Kĕchi's head-kerchief still lying on his bed. Enche Yahya brings it back and is duly rewarded. Raja Kĕchi' decides to shoot Upu Daëng Parani from the verandah of his house, as he has information that the Bugis will bring their ships opposite his village. He places swivel-guns there, and when the ship of Upu Daëng Parani comes up, followed by the other ships, he opens fire and kills Upu Daëng Parani, who is sitting on the roof of the cabin. In great fury the Bugis fire from their ships, land and storm the village, killing every man of Siak and Kĕdah they see. The village is burnt, and Raja Kĕchi' with his followers flees to Siak. Upu Daëng Parani is buried with royal honours, and with the permission of the Yamtuan of Kĕdah the Bugis return to Riau.

(Here again a long *shaër* is inserted, describing the above fight, but differing in detail. The stockade of Raja Kĕchi', which was retaken by Enche Yahya, fell into the hands of the Bugis again. Raja Kĕchi' sent a messenger to the Bugis inviting them to come up with their ships to his village (for an interview?): thus Upu Daëng Parani was killed by treachery. The Bugis stormed the house of Raja Kĕchi', killing everyone they found, "drinking their blood", and burning the house. When they return to Riau, prayers are read for the deceased, and the royal ladies mourn his death. Hard words are said by Tĕngku Tĕngah, the widow of Upu Daëng Parani, and by Tĕngku Mondok to Tĕngku Kamariah, who is driven out of the room).

The Bugis fortify Riau, and promote trade. Riau flourishes after nearly eight years of trouble.

A.H. 1136 Raja Kĕchi', who had fled to Siak after his defeat in Kĕdah, thought again of making trouble in Riau, and if he could not conquer it, to disturb the Raja of Johore and Riau as soon as possible. But he wants to get into Riau first by peaceful means, as his family is still there. He prepares a fleet, sails to Riau and sends a letter to the Sultan saying that he had come to visit his family and the Bugis princes. In the council held by Sultan Sulaiman his high dignitaries do not want to admit Raja Kĕchi', but the Bugis think that he should be allowed to see his family, as otherwise he would say that they were afraid of him. They should, however, prepare for all eventualities, and a buffalo is slaughtered as a sacrifice to ensure the success of their arms (*mĕnyĕmbĕleh kĕrbau mĕnchirak dan mĕnyemah sĕnjata-nya*). Raja Kĕchi' is admitted, meets Sultan Sulaiman and the Bugis princes and goes to see his wife and children.

But during the night the Siak-people erect stockades. The Yamtuan Muda sends a messenger to Raja Kĕchi' asking the

reason; he replies that his people are afraid of the Bugis, and refuses to demolish the stockades. Occasional fighting ensues between the people of Siak and the Bugis. Raja Kĕchi' is allowed to go unmolested to visit his family, where sometimes he meets Upu Daëng Challa and shares his meal with him, but on his return to his stockades fighting often commences again. This lasts from the 29th Shaban to the 20th Dzu'l-hijah; then the Yamtuan Muda orders the Bugis to attack the stockades. A challenge is sent to the Siak-people, and both parties fight, until the drums in the evening call them back. Food becomes very dear in Riau, as no rice from Java or Bali is brought in by the merchants. The Yamtuan Muda represents to Sultan Sulaiman that Raja Kĕchi's purpose to ruin Riau and its trade is sure to be accomplished ere long. They decide to tell Raja Kĕchi' to leave the country on the following day, and if he wants a fight, he can have it. Raja Kĕchi' excuses himself that he had come with no bad intentions, that all the trouble had come from his men being afraid of the Bugis, and that fighting had not started from his side. The Bugis then build stockades opposite those of Raja Kĕchi', and their fleet anchors opposite his fleet. The merchant-vessels and the people living on the coast are told to get ready to go up river when they hear the guns firing, in order to cut off the retreat. The people of Siak, endangered by the stockades and the fleet, decide to ask their prince to stop going to and from his family, to stay with them in the fort and to make either peace or war. Raja Kĕchi' thinks he will make peace first, in order to get his family out of the hands of the Bugis. His people feel that he thinks only of seeing his family and forgets to take care of the welfare of his people and his country. Raja Kĕchi' sends his wife to Tĕngku Puan (Mondok), the wife of Upu Daëng Challa, to arrange an understanding. She meets Upu Daëng Challa there and informs him that Raja Kĕchi' wants to take her and her children to Siak. Upu Daëng Challa replies that that rests with the Sultan and the Yamtuan Muda; he has no faith in Raja Kĕchi's offering peace unless he demolishes his stockades, swears in the mosque that he will not molest Riau any further, and gives back all the people he had taken away at the conquest of Johore. If he refuses these terms, the Bugis will attack in earnest. Tĕngku Tĕngah comes while they are talking, and warns Upu Daëng Challa not to believe the treacherous Menangkabau-prince, as Raja Kĕchi', being jealous of Riau, had no other purpose but to ruin it. The sisters do not even believe that Raja Kĕchi' is going to make Tĕngku Kamariah his reigning queen. The latter at last goes to her husband, accompanied by the eldest servants of the palace, and Upu Daëng Challa informs that Sultan and the Yamtuan Muda of what has happened; they both agree to the three conditions. A messenger is despatched to Raja Kĕchi' to inform him officially of the terms and the Yamtuan Muda has told Raja Kĕchi', that the Bugis, are bound by honour and kinship to see that, Johore having become a

"field for turtledoves", Riau should flourish. So, if Raja Kĕchi' would rather fight, he should not, when the fighting had commenced, run away or ask pardon, as there were five things in a Bugis warrior's code of honour:—not to pursue a fugitive enemy, unless it was necessary in order to gain a decisive victory; not to refuse a man asking for pardon; not to grudge the fallen, even of their own family, as death is a warrior's lot; not to hold an enemy in contempt, even if he was weak; and fifthly not to kill an ambassador, in war or peace.

Raja Kĕchi' accepts the conditions and reasserts his good-will to Sultan Sulaiman and the Bugis princes, who are all related to him, promising to meet them on the following day. The Sultan and the Upus are informed of this promise and retire, the Sultan saying that Raja Kĕchi' to all appearance would not bite any more, being much weakened. Upu Daëng Challa tells Tĕngku Tĕngah of what has happened, but she has no faith in any promise of the Menangkabau.

The next day all assemble in the audience-hall of the Sultan. Raja Kĕchi' arrives late with his followers, greets the Sultan and the Bugis princes and takes his seat opposite the Sultan. Gilt betel is served and eaten. Raja Kĕchi' agrees to accept the terms on oath. Officials and warriors assemble, armed with the *kĕris* (*pĕndua*), many angry glances being exchanged between the former enemies. They go to the mosque, and sit round the prayer-stool. The Yamtuan Muda asks Raja Kĕchi' to ascend the prayer-stool and with the Koran on his head swear to the agreed conditions. An awful silence ensues, and the warriors stare at each other with right hands on the kĕris. Upu Daëng Challa smiles and asks again: "Pray, my elder brother, take the oath, as it is getting late." Raja Kĕchi' replies: "It is well, younger brother," and ascends the prayer-stool, while the Yamtuan Muda and Upu Daëng Challa stand to his right and left. The Imam brings the Koran, ascends the prayer-stool, sits down opposite Raja Kĕchi' and offers the Koran on his knees. Raja Kĕchi' swears: "By God and by His Prophet! I will commit no more treachery (*khianat*) against my younger brother, Johore and Riau, and I will return all the people of Johore who are in my hand. If ever I break this oath, may I never have peace again, and may I be destroyed by sacred steel[1]!" Upu Daëng Challa answers: "Praise be God, elder brother! We all believe you, but, if you renounce what you have sworn, by God's will, your children and grandchildren shall be scattered all over the world as seeds of the Nipah-palm scatter when the fruit is split, and your royal power (*daulat*) shall perish and be replaced by that of others." Raja Kĕchi' replies: "So be it, younger brother." Raja Kĕchi' descends from the prayer-stool and all return to the hall, where the Yamtuan Muda proclaims the peace between his people and those of Siak. The people con-

1. (di-) makan bĕsi kawi-lah saya.

firm it, the Imam reads a prayer, and all say Amen. A banquet is held, Raja Kĕchi' asks leave to depart to Siak, which is granted by Sultan Sulaiman, and returns to his family. The Yamtuan Muda proposes to the Sultan that their fleet should accompany Raja Kĕchi' until he had reached the sea, and that their war-vessels should not be laid up, as they could not know what treachery the enemy might commit. Thus it was done. Raja Kĕchi' returned to Siak, and according to some authors had no other occupation but thinking how he could destroy Riau and the Bugis, whom he hated with all his heart.

One day, in council one of his ministers reminded him of his oath taken in the mosque, but Raja Kĕchi' made light of it and told him to mind his own business. The *mĕntĕri*, though condemning the prince for his treachery, advised him to fetch first his wife and children from Riau, so Raja Kĕchi' went there with four or five smaller warships (*kakap*), met Sultan Sulaiman and asked to be allowed to take his wife and children to Siak, as he wanted to make the princess his queen (raja pĕrĕmpuan), and if the Siak chiefs should agree, to make his eldest son Mahmud (also called Raja Buang)[1] his successor, so as to better the relations between Riau and Siak. Sultan Sulaiman consented, and Raja Kĕchi' went to Tĕngku Kamariah, told her of his plans and asked her to prepare for the voyage. The following day she visited her sister, Tĕngku Mondok, the wife of Upu Daĕng Parani; Tĕngku Tĕngah, and also her brother, the Sultan. She found them together, and the Sultan gave her good advice that in another's house she should not do as in her own, and should make good friends with other royal ladies and with the wives of chiefs. Raja Kĕchi' and Tĕngku Kamariah took leave of the Sultan and his family, and of the Bugis princes. The ladies of the high officials brought them on board, and one high dignitary of Riau accompanied them to Siak, and Tĕngku Kamariah was made Raja Pĕrĕmpuan of Siak in due course.

At Siak Raja Kĕchi' continued his preparations for a new attack on Riau. He levied contributions in money and provisions, had ships equipped, and in a moment auspicious for the magical blessing of the ships (mĕlangkah) sailed for Riau and halted at Pulau Bayan. In Riau all war-vessels were ready, having never been laid up since Raja Kĕchi' had left the first time. The people at Pulau Bayan did not know what to do; they wanted to attack Raja Kĕchi' at once, but thought of the oath and the peace proclaimed by the Yamtuan Muda. So they informed the Yamtuan Muda of Raja Kĕchi's arrival, and a spy was sent to watch, who found that Raja Kĕchi' was building stockades at Pulau Bayan. Sultan Sulaiman thought first of reminding Raja Kĕchi' of his oath, but the Yamutan Muda was for an attack at once; before starting to fire they could shout that whosoever had swerved from

1. cf. *supra*, where he is called Tĕngku Muhamad Sultan.

the agreement and oath, should be destroyed by that oath, he and his children and grandchildren. The Sultan agreed, and it was arranged that the fleet should attack Raja Kĕchi' at Bayan, whilst a Bugis party should go by boats through small channels, circumvent Pulau Bayan, land there and attack Raja Kĕchi' from the back in the evening.

The fleet sailed down and took up a position opposite the fleet and stockades of the Siak-people. Before firing commenced. a Pĕnglima of Riau called out the message as above, and furiously Raja Kĕchi' gave order to open fire. A gun-battle ensued, and on the next day a select party of three hundred Bugis landed and stormed the stockades, turning the guns on the men from Siak, who had had no time left to take them away. The Siak-people were in a fix, as they cauld hardly turn their ships round to fire on the Bugis ashore, and at nightfall the Bugis, who had come by boats through the channels, attacked their rear. Raja Kĕchi, as soon as it was dark, gave the sign that his fleet should retire; he himself jumped into a boat, rowed to his vessel lying at Tanjong Pinang and sailed away to Siak through the Straits of Tiung. Of his fleet many men and many vessels perished, and when morning came there was nothing left but the dead and the wrecks, and on the sea the sails making for Lobam and the Straits of Tiung. Upu Daëng Challa forbade pursuit, as it was against his code of honour.

The victors were received in Riau with great honour, and feasted. This defeat of Raja Kĕchi' took place A.H. 1139, and it was the end of the war with Raja Kĕchi' during the reign of Upu Daëng Marioh at Riau. Eleven years later Raja Kĕchi' attacked Riau again and was again defeated. He then died, and Raja Alam attacked Riau, as will be narrated later on.

While Upu Daëng Challa was Raja of Riau, for about eleven years it was peaceful and flourishing. Hundreds of vessels came from Bengal, from Java, from the further East, from China, from Siam. The people of Riau became rich, especially the Bugis, as many of them were exempted by the Yamtuan Muda from paying custom-duty and harbour-dues (*laboh batu*). Thousands of Chinese came to work as coolies in the gambier-plantations. According to one tradition it was a Bugis, (the) Pĕnggawa (of) Tarum, who first planted gambier by order of the Yamtuan Muda; according to another story it was the headman of Chĕdun, who obtained the seeds from Sumatra. Then all the Bugis, immigrants as well as those born in the country, got rich from growing gambier, there being hundreds of plantations, all worked by Chinese coolies. The Yangdipĕrtuan Muda, Tĕmĕnggong, Bĕndahara and Shahbandar were overwhelmed with presents, and all were very happy. The revenues amounted to hundreds of thousands in every season, and a large fleet of big vessels heavily armed was kept, partly ready, partly laid up. The Sultan, all the high dignitaries and princes built fine palaces. Sayids and Shaikhs,

saints and learned men from Arabia flocked to Riau and lived near the mosque and in the coast-villages. Religious and temporal law was strictly kept, a law-code was compiled by the high dignitaries and the chiefs, weights and measures were controlled, and justice was dealt out equally to Bugis and Malays. About seventeen years this happiness lasted under the reign of the Yamtuan Muda Upu Daëng Challa, who also helped the people to his best ability when Raja Kĕchi' worried Riau again, and food became dear, and the poorer people wanted to leave the place.

Now a letter came from the Sultan of Sambas, Sultan Aadil, after Upu Daëng Parani had perished in the second Kĕdah war and had been buried in Kĕdah, inviting the five princes to come and visit him, and if they liked, to settle in Sambas. The Upus decided that Upu Daëng Kamasé should go, and that Upu Daëng Manambun should return to Matan, which he had left so long ago. They swore that they would always stand by each other, and if at any time one of them should have trouble, the other brothers was bound to help him. Upu Daëng Manambun and Upu Daëng Kamasé sailed with seven ships to Sambas. They were received with royal honours. A house was already built for them, and they took their abode there. The Sultan sent seven of his eldest mĕntĕris to them and repeated his wish that they should settle in his country, and that one of them should marry his sister, Raden Tĕngah. Upu Daëng Manambun accepted for his younger brother, Upu Daëng Kamasé, who had not yet a home of his own, and Upu Daëng Kamasé was married according to royal custom, and was made Pangeran Mangkubumi of Sambas.

(Here a long *shaër* is inserted, describing the marriage and the installation as Mangkubumi. When the bridegroom returns from the ceremonial procession, the door of the palace is closed in his face and he is admitted only after having paid the marriage-money).

For forty days Upu Daëng Manambun stayed at Sambas, then asked leave to return to Matan, having been away for about three years sailing to Siantan, Palĕmbang, Malaka, Kĕmboja, Riau, Siak, back to Riau, to Kĕdah, back to Riau, and now to Sambas. The Sultan consents, as he has news that the old Sultan of Matan is unable to fulfil his duties (*uẓur*), and that Pangeran Ratu quarrels with his younger brother Pangeran Mĕngkurut over the succession. Upu Daëng Manambun sails with six vessels to Kandang Kĕrbau and up to the old town, where Sultan Muhamad Zainu'd-din receives him with royal honours and gives him the title of Pangeran Ĕmas Suria Nĕgara. He puts him on the same rank with his sons and asks his high dignitaries to choose one of them as his successor. The dignitaries cannot agree, and after two months a general assembly is held. All the people from the country (hills) and the Maya's (Dayaks?) come, and these two

parties are called the "Siring Mambal."[1] According to the custom of Matan, if a king is chosen, and all the mĕntĕris agree, but the Siring Mambal not, the king cannot be chosen. (Apparently no agreement can be reached), and the mĕntĕris return to the king and represent to him the following: As to his sons Pangeran Ratu and Pangeran Mĕngkurut, they quarrel over the succession while the Sultan is still living, and it will be worse, when he is dead (therefore they do not want to fix their choice for the present?). As regards Pangeran Ĕmas Suria Nĕgara, he should be sent to Mĕmpawah, as the Sultan's wife, Ratu Ĕmas Indĕrawati, is the daughter of the Pĕnĕmbahan of Sĕngkawu', who is the Raja of Mĕmpawah. She is the only child of her mother, Putĕri Chĕrmin, the daughter of Raja Kahar, prince of Batu Rijal in the upper country of Hindala Kiri. The reason of his having come to Mĕmpawah was his having quarrelled with his elder brother, who had become Raja of Batu Rijal. Raja Kahar had inherited from their father two swords, belonging to the royal family-treasure, for which his brother had asked, but Raja Kahar had refused to give them up, saying that his brother had inherited the kingdom, and it was only right that he himself should have the two swords as heirloom. They had quarrelled, and Raja Kahar had left Hindala Kiri in a ship with thrty men, seven servant girls and his daughter Princess Chĕrmin, who had lost her mother when born, and whom he could not leave behind. He went first to the mouth of the Sambas-river, where he stayed for three days, but having no good omen in his dreams, sailed to Mĕmpawah. Staying at the mouth of the river, he dreamt that he held the sun in his grip, and sailed up to Mĕmpawah, where the Pĕnĕmbahan of Sĕngkawu' invited him to stay and gave him a house. The Pĕnĕmbahan fell in love with Putĕri Chĕrmin, the daughter of Raja Kahar, and asked her in marriage, to which Raja Kahar agreed on the condition that his thirty followers were given wives. The Pĕnĕmbahan accepted and was duly married to Putĕri Chĕrmin. They had a daughter, Princess Ĕmas Indĕrawati, who in course of time was betrothed to the Raja of Sambas, Ratu Anom Kesumu Yuda. After this betrothal, Sultan Muhamad Zainu'd-din of Matan also sent to Mĕmpawah to ask Princess Ĕmas Indĕrawati in marriage, and being informed of her betrothal to the Sultan of Sambas, sailed with seven ships to Sĕngkawu', asked the Pĕnĕmbahan for the hand of his daughter and was duly married. Three days afterwards he asked for permission to return to Matan and to leave his wife with her father for the present. But the latter was afraid of the Sultan of Sambas, to whom his daughter had been affianced, and Sultan Muhamad Zainu'd-din decided to take her with him and make her Ratu Sultan, to reign over his palace and all the

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[1] سيريغ ممبل

women of Matan. Her mother, Princess Chĕrmin, with the permission of the Pĕnĕmbahan followed her only child to Matan, and stayed there. Already three letters had come from Mĕmpawah, one to the Sultan, one to Princess Chĕrmin, and one to Princess Ĕmas Indĕrawati, announcing the death of the Pĕnĕmbahan. The *mĕntĕri* think that the Sultan's wife, Princess Ĕmas Indĕrawati,, should return with her mother, Princess Chĕrmin, to Mĕmpawah to claim the heritage due to her as only child of the late Pĕnĕmbahan, and that Pangeran Ĕmas Suria Nĕgara should accompany them to become Raja of Mĕmpawah.

Sultan Muhamad Zainu'd-din agrees to the plan, the people are called together, and Pangeran Ĕmas Suria Nĕgara and his wife are carried in procession round the town to the (*Pancha Pĕrsada*) royal bathing-pavilion, where they are bathed ceremonially. The Sultan proclaims his daughter, Princess Kĕsumba, to be Agung Sĕnuhun, and the people do homage to her and her husband, whilst guns are fired and music plays. When the festivities are over, the Sultan calls his mother-in-law, wife, daughter and son-in-law and tells them of his plans. They agree, and the Sultan gives permission that anybody who likes to do so may follow them to Mĕmpawah, both people of the palace and of Matan. With a fleet of forty ships they leave Matan, as many people also of the better class of Javanese, Malays and Bugis, including Enche Kĕrabang and Enche Kwini, follow them to Matan. The Sultan accompanies them to Sukadana, where they bid farewell to each other and prayers are read for a happy issue of the venture.

They reach Mĕmpawah and halt at Sĕbukit, where the Pangeran wants to build a town, and the jungle is cleared. Sĕbukit was formerly a country, ruled by Patih Kĕmĕtar, who was the father of Ni' Nyabang. The latter made the agreement with the Raja of Sambas, Ni' Riu' by name, and (with?) Raja Dilara Sapĕlayu (the Raja of Lara Sapĕlayu?) went to Pulau Samsa' to amuse themselves there.[1] They were the first to call the Sungai Raya the "Sungai Raya Sĕbaya' Bian," as "Sungai Raya" means "great amusement" and "Sĕbaya" means "together" (*sama-sama*). Together they placed a number of stones into the sea and called them *batu bĕlat*, and up to the present day they are still called *batu bĕlat* and are to be found on the western side of Pulau Samsa', stretching in a line from the sea to the shore. They were called *batu bĕlat* as they were placed there as a treaty token, as the country from the hills which lie in a line with the *batu bĕlat*, belongs to Sambas, and that on the other side of the line belongs to Mĕmpawah. When the place is cleared, the Pangeran builds a palace there, and his people houses. When they have settled down, Pangeran Ĕmas Suria Nĕgara and the three royal

1. This passage in the Malay text is hardly intelligible.

ladies sail with thirty ships to Sĕngkawo', pray and give alms at the tomb of the late Pĕnĕmbahan in fulfilment of their vows and hold festivities there.

This story comes now to the Pangeran Dipati, who lived at Pinang Sĕkayu, further up the river of Sĕngkawo', who was, as all of his rank, a cousin in the first grade to the Pĕnĕmbahan of Sĕngkawo'. He had four children, the eldest a son, Raden Jaga, a daughter Ĕmas Sĕri Sangka, another daughter Ĕmas Chandi (Chindai?), and the youngest a son, Raden Mari. When the Pĕnĕmbahan died, the Pangeran Dipati had taken charge of the royal insignia, treasures, servants and all the *dayak* of Mĕmpawah. When he heard that Pangeran Ĕmas Suria Nĕgara with the royal ladies was visiting the tomb of the late Pĕnĕmbahan, he came with his wife and his family; and great festivities were held. Seven days later Princess Chĕrmin and her daughter, Ratu Sultan Ĕmas Indĕrawati, visited the Pangeran Dipati to inquire after the possessions of the late Pĕnĕmbahan, and everything was delivered to them, including the royal insignia, the two swords brought from Batu Rijal, the halberds, the *susunan* (sets of trays and bowls?), the Javanese pages (?, *bujang Jawa*) and so forth, as Princess Chĕrmin knew everything which belonged to the royal insignia. Princess Ĕmas Indĕrawati claimed as her inheritance the Dayaks of Mĕmpawah, Pabahar and Melinsam, as it is the custom there that to the Pĕnĕmbahan belong the Dayaks of the tribe (? *sĕkayu*) of Mĕngkawah, and to the Pangeran Mangku those of the tribe of Pabahar. Some princes are given one or another tribe of Dayaks to get their revenue from them, but the Dayaks of Mĕmpawah could never be given to anybody but remained under the Pĕnĕmbahan. They were of five countries, which were compared to our five fingers, and those belonging to the Pĕnĕmbahan were the Dayaks of Sangkang, Kacha', Sĕmbaya', Lumut and Sĕbuwu. But none of these Dayaks the Pangeran Dipati was willing to give back, and the ladies decided to wait for a later opportunity and to return to Sĕbukit with what they had received, being thankful that they had obtained it without any quarrel.

The story returns to Upu Daëng Biasa, who had become Major of the Bugis at Batavia under the Dutch Company. He had a son Upu Daëng Kĕlula. When he heard that the five brothers had made their fortune at Riau, Sambas, Matan and Mĕmpawah, he bade his son visit them and inform them that their debts with the merchants of Batavia, which the Major had guaranteed, had already been paid by him, as at the time when the Chinese under Si Panjang had attacked the Kota Intan of Batavia,[1] he had taken the side of the Dutch with all the Bugis and the men of Makasar and Mandar, and after the victory had received so many presents, that he had paid all the debts of his brother and nephews, so that they should trouble no more about

1. A. D. 1740?

it, and his son and heirs would never ask them to refund the money. Upu Daëng Kĕlula should further choose amongst their sons a suitable husband for his own daughter, as he had been unable to find one in Batavia. Upu Daëng Kĕlula sailed for Riau, taking with him letters and presents from the Major to his cousins, but met with bad weather and was blown to Mĕmpawah. He visited his cousin at Sĕbukit, who received him with honour and gave Upu Daëng Kĕlula a house.

For about one month Upu Daëng Kĕlula stayed at Mĕmpawah and sold merchandise with so much profit that it became proverbial as *untong Bĕtawi*.[1] He asked Pangeran Ĕmas Suria Nĕgara for permission to return to Batavia the latter's son Gusti Jamril, to be married to his daughter Daëng Muda. Daëng Kĕlula had three wives, the first the daughter of the Raja of Makasar, she being the mother of Daëng Muda who later became the mother of Sultan Muhamad Zainu'l-Abidin, Raja of Mĕmpawah. His second wife was a Chinese lady, born in Batavia; she gave birth to a daughter, Daëng Nyonyah, who became the mother of Daëng Mĕrta. His third wife was Mĕrdi, whom he had brought from Mandar to Batavia, and with her he had three children, two sons, Daëng Mĕmpa' and Daëng Chachu, and a daughter, Daëng Lila, who became the mother of Pangeran Anom and of the Pĕnĕmbahan Adinata Kĕrma Omar Kamaru'd-din.

Pangeran Ĕmas Suria Nĕgara agreed to the proposal, and Gusti Jamril, accompanied by a few followers, sailed with Upu Daëng Kĕlula to Batavia, which they reached after fifteen days and nights. When they had passed the "Boom" (custom-house), they took a carriage to Kampong Bharu and paid their respects to the Major, who liked Gusti Jamril very much. Three days later he brought Gusti Jamril and Daëng Kĕlula to see the General Himhof (Governor-general van Imhoff[2]) at the Kota Intan of Batavia. The guard outside saluted the Major, and when they reached the General's house, they were greeted by him and asked to sit down on chairs, and tea was brought by the servants. The Major informed the General of the intended marriage, and the General asked him to let the marriage-procession pass the Kota Intan, so that he could do honour to the bridegroom, promising further any assistance the Major may require. Festivities are commenced at once, and when the marriage-service has been read, the bridegroom is carried round the town in a bridal coach, followed by a procession of carriages of Europeans and all the other races, when the Major had invited, and preceded by armed men and the music and players and dancers of the different races. The procession goes direct from Kampong Bharu to the Kota Intan, where 11 guns are fired, and two companies of soldiers with drums and trumpets take their places right and left of the

1. A "Batavia = profit."
2. A. D. 1743-1750.

bridal coach, whilst the carriages of the colonel, the major and other friends of the Bugis Major join the procession, and great is the joy of Upu Daëng Biasa and his friends over the honour done him by Governor-General van Imhoff. The procession returns to Kampong Bharu, where the remaining marriage-ceremonies take place, and a banquet, to which all the friends of the Major, of all races, sit down, concludes the festivities. Three days later the young couple takes the ceremonial bath.

After a stay of five months Gusti Jamril asked leave to return to Mĕmpawah, his wife to stay with her parents for the present. The Major agreed and sent Daëng Lulu with a vessel to accompany him. He gave Gusti Jamril a message to his father that after the Major's death Gusti Jamril should fetch the whole family of the Major to Mĕmpawah. When the ships were ready and loaded with merchandise to be sold in Mĕmpawah, Gusti Jamril and Daëng Lulu took leave and sailed to Mĕmpawah, which they reached after a fortnight. Gusti Jamril sent Abdul-Wahab to inform his father of his arrival, and they were brought in by two vessels-of-state with music playing. Eleven guns were fired when they reached Sĕbukit, greetings exchanged, the presents from the Major delivered, and a great banquet held in the audience-hall. Daëng Lulu was given a house and after prayers, Gusti Jamril was brought into the palace, bathed with water to ward off all evil influences, clothed in new clothes, according to royal custom, and then brought to do homage to the royal ladies, kissing their knees and being kissed on the head, whilst prayers were said.

Three months later Gusti Jamril asked leave to sail to Pinang Sĕkayu to sell goods brought for trade with the Dayaks; gongs, *chanang, kĕromong, tawak-tawak* (different kinds of gongs), *pahar* (copper-trays on a foot), *bokor* (metal-vessels without foot and a broad, flat rim), *sĕmbirit* (*sĕmbĕrip?* a copper-bowl for food, with upright rim and round, hollow foot, smaller than the *pahar*) and *talam* (great brass-trays). His father had no objections and told him to pay his respects to the Pangeran Dipati, who had not yet seen Gusti Jamril. He arrived safely at Pinang Sĕkayu, kissed the Pangeran Dipati's knee and was received with great love by the old man, who being a first cousin to the late Pĕnĕmbahan treated him as a grandfather would have done. Gusti Jamril received permission to trade further up river and went to the landing-place of the Salih Dayaks, where he sold some of his goods with great profit. He was summoned back to Pinang Sĕkayu to pay his respects to the Pangeran Dipati's wife. He had to read and explain the Koran to the old lady, who was pleased with his learning. A banquet was given in his honour, ending with a prayer read by the Imam, and then the Pangeran Dipati offered one of his daughters in marriage. Gusti Jamril replied that in this matter he would have to consult his parents, and went back to the Dayak-village. The Pangeran Adipati arranged

a pleasure- and fruit-gathering-trip up the river, accompanied by his son Raden Jaga and his daughter, Ĕmas Sĕri Sangka and her girl-friends. They went upstream, fetched Gusti Jamril and had a great day gathering fruits in the jungle, returning afterwards with Gusti Jamril to Pinang Sĕkayu, where the latter was detained for two days and nights. The Pangeran Dipati then broached again the subject of a marriage between Gusti Jamril and his daughter Ĕmas Sĕri Sangka. Gusti Jamril refused as well as he could and was told to go to Sĕbukit to consult his parents; his trading-vessels could remain where they were during his absence. Gusti Jamril informed his three captains, Enche Sabah, Enche Abdul-wahab and Pĕnglima Malu', of his intended trip, asking them to send down to him all such goods as he could take with him in a boat. They obeyed, and having taken leave of the Pangeran Dipati, Gusti Jamril went downstreams and informed his parents. Pangeran Ĕmas Suria Nĕgara had no objections on principle, but Gusti Jamril had already a wife at Batavia and had promised to take her and her family to Mĕmpawah. Probably she would not come if she heard that Gusti Jamril had a wife at Mĕmpawah, and thus nothing would come of his own wish to have his whole family from Batavia at Mĕmpawah, and of his uncle's hope that his family should be taken care of at Mĕmpawah. Gusti Jamril promised to follow his father in all things, and Dĕmang Rilaka Pĕnawuna Chia' was told to fetch the three ships from Salih. He was given a list of the debtors, Malays and Dayaks, and was told to ask for the money, which was already overdue, at once, using some force. He was further given a letter and presents for the Pangeran Dipati, which he delivered in due course. In the letter was said that Gusti Jamril had to go at once to Batavia to pay for the goods he had taken on credit there from European and other firms, but that after his return he was sure to pay his respects to the Pangeran Dipati. In the meantime Dĕmang Rilaka should collect the debts, and the Pangeran Dipati was asked to help him if necessary, so that he should return quickly and Gusti Jamril should have no trouble about the money. The Pangeran Dipati said nothing when he had read the letter, but Raden Jaga opined that there would be trouble. He was shown a list of the debtors, and with his permission Dĕmang Rilaka went to Salih. He called the debtors and read the list to them; they acknowledged the debts, but asked for a respite of two or three months to collect the money. To this Dĕmang Rilaka would not agree, as they had bought on cash-terms, and the men departed but conspired and went to Raden Jaga, to whom they complained of the hardness of Dĕmang Rilaka. Raden Jaga called all the Muslims of Pinang Sĕkayu and at midnight attacked Dĕmang Rilaka from the river as well as from shore. Dĕmang Rilaka fought as well as he could, but numbers were against him; he put the goods which were ready packed into boats, and fighting went downstream through the fleet of his assailants and made his

way to Pinang Sĕkayu. When he reached the place, he shouted that the people of Pinang Sĕkayu had paid good with bad, and in days to come would suffer for it. He reached Sĕbukit and reported what had happened to Pangeran Ĕmas Suria Nĕgara, who became very angry with Raden Jaga and promised to punish him for his evil doings. He prepared a fleet and sent messengers to his brothers, the Pangeran Mangkubumi Upu Daëng Kamasé of Sambas, and those at Riau, asking to help him. The Pangeran Mangkubumi came with five warvessels, and the Bugis swore again allegiance to each other, whilst a buffalo was slaughtered for the *mĕnchirak* of their arms. With a fleet of fifty vessels they sailed up to Tĕrinda, where fighting commenced, as the Pangeran Dipati in the meantime had built stockades all along the river and had bidden the Dayaks of Sĕngkawo' and Mĕmpawah attack the ships from the shore. These stockades were soon taken by the Bugis, as at that time the Dayaks were not accustomed to firearms and run away. When the Bugis reached Mĕlinsam, they built a stockade, and the Pangeran Dipati built one on the opposite shore of the river, where both parties watched each other for three months. Pangeran Ĕmas Suria Nĕgara got into communication with the chiefs of the Dayaks; he explained to them his lineage and marriage, and many went over to him, as they recognised in him the direct descendant of the Pĕnĕmbahan of Sĕngkawo'.

The Andriguru[1] Lĕmalu', who had been sent to Riau, delivered the letter to Upu Daëng Marioh, the Yamtuan Muda, and to Upu Daëng Challa. But shortly after his arrival Upu Daëng Marioh died at Pitung, when returning from Tapokan, and his body was brought to Riau, where everybody mourned for him. He was buried with royal ceremonies at Sungai Baharu, and obsequies were duly held on the third, seventh, fortieth and hundredth days after his death. Upu Daëng Challa was made Yamtuan Muda of Riau, but remained sad, as two of the five brothers had already died, and the others lived in foreign countries. When all was settled, he equipped seven warvessels and sailed to Mĕmpawah.

When the Raja of Landak, Ratu Bagus, heard of the fighting at Mĕmpawah, he came with the Mohammedans of Landak and the Dayaks of Bĕnyuki to Pinang Sĕkayu, went to the Pangeran Dipati and told him that he had come with his brother Raden Osman to stop the fighting with his cousin, the Pangeran Ĕmas Suria Nĕgara, and to make peace between them. The Pangeran Dipati was quite agreeable, as his son, Raden Jaga had started the quarrel without investigating properly. Ratu Bagus went to Mĕlinsam, visited Pangeran Ĕmas Suria Nĕgara, and asked him to stop the fighting. Whilst they were having their meal, news came

1. اندري كورو , apparently a Bugis title for a military officer, frequently occurring in the text.

that the Yamtuan Muda of Riau had arrived, and Pangeran Ĕmas Suria Nĕgara asked leave of Ratu Bagus to consult his brother first before replying to his proposal, suggesting that they should go together downstream to welcome his brother. The Mangkubumi of Sambas, Gusti Jamril and his brothers were left behind to guard the stockade. When the brothers met at Sĕbukit, they went to the palace, and Pangeran Ĕmas Suria Nĕgara informed the Yamtuan Muda of what had happened and of Ratu Bagus' proposal. Upu Daëng Challa replied, that he had been called to fight, and now he had come they wanted to make peace; he was quite agreeable, but would like to try a fight with the Pangeran Dipati and Raden Jaga first, as his brother's cannons had already been fired, and even if that had not been done, they should be fired now, to show that his brother stood not alone but had flesh and blood in other countries. He had come late and in a hurry on account of the death of their brother, and if they could not gain a decisive victory at once, he would send to Riau for a three times larger fleet. But he had no doubts about a speedy victory, as the Dayaks, who ran if they heard a matchlock fired, would flee at once when they heard the roar of the cannons and swivelguns, and the Mohammedans of those parts had never faced an open attack, their warfare being carried on like that between a kite and a chicken; he had seen enough of it coming up the river.

After the meal the Yamtuan Muda returned to his ship, and Ratu Bagus went home with the Imam of Sĕbukit, with whom he stayed. Now by the will of God it came to pass that Ratu Bagus asked the Imam to help him to marry Utin Duwaman, the daughter of Pangeran Ĕmas Suria Nĕgara; if his suit would be accepted, he would do whatever Pangeran Ĕmas would like. The Imam informed Pangeran Ĕmas, who consulted his brother the Yamtuan Muda; the latter was agreeable and took it as a good omen for victory. At the marriage the Yamtuan Muda would swear allegiance to him, drawing his weapon, and promising to make the bridegroom Pĕnglima Pĕrang, whilst he himself would undertake to be Pĕnglima Bĕsar. As Pangeran Ĕmas Suria Nĕgara and his wife had no objections, the Imam was told to inform Ratu Bagus that his proposal was accepted, and that the marriage should take place in three days. The bridegroom should, however, not become afraid at the *mĕngaruk* of the Bugis, which was a sign of their being pleased. The Imam told Ratu Bagus and informed him that the marriage would be informal, consisting of the reading of prayers only, as in wartime they could not have the full ceremonies; if they should be victorious, they could have the festivities later. He further told him of the Bugis custom *mĕngaruk*. Raja Bagus was pleased and satisfied, and began at once with the festivities. On the third day he was carried in procession to the audience-hall, where the marriage-service was read, and then into the palace where he took his place next to the bride, and the couple partook of the ceremonial rice. Then the Bugis commenced the

*mĕngaruk;* the Yamtuan Muda drew his *kĕris,* presented a new suit of clothes to the bridegroom and proclaimed him Pĕnglima Pĕrang with the acclamation of the people and the firing of eleven guns. In the same manner the Yamtuan Muda was proclaimed Pĕnglima Bĕsar by Pangeran Ĕmas Suria Nĕgara. When the ceremonies were over, the order was given to return to the war three days hence, and prayers read by the Imam concluded the festivities.

Three days later they moved upstream again and reached Kuala Sangking. The Pangeran Dipati heard of the marriage and the coming of the brothers of Pangeran Ĕmas Suria Nĕgara from Sambas and Riau, and held a council of war. His ministers represented to him all the trouble caused by the rashness of Raden Jaga, which had involved them in a quarrel with four countries. And their own Dayaks were going over to Pangeran Ĕmas Suria Nĕgara, as the royal ladies and the royal insignia were with him at Sĕbukit. The old prince said nothing. It had gone with him as in the proverb: a fire starting can be easily quenched, but if it has grown big, it is very hard to extinguish.

When the fleet from Sĕbukit arrived, the three brothers were united again after many years, and together they mourned the death of Upu Daëng Marioh. The three sons of Pangeran Ĕmas Suria Nĕgara paid their respects to their uncle the Yamtuan Muda. A council of war was held, and on a Tuesday, when the shadows were about three feet long, an attack on the stockades on the other side of the Mĕlinsam-river was made. Two stockades were taken; the third was that of Raden Jaga. The Bugis battered down the port, and the people fled over the flat part on the other side to Pinang Sĕkayu. The town was soon taken, but when the Bugis reached the courtyard of the Pangeran Dipati, they found that he had fled. They wanted to pursue him, but Pangeran Ĕmas Suria Nĕgara decided to stop for a day or two, and the houses were plundered, but not burned. The people of Pinang Sĕkayu had fled by land and river; when they reached Mĕngkapas, they left behind the Kiayi and Pĕngĕrah to build a stockade there, and the princes with their men stayed by the mouth of the Sumpa' river at Tombong Bangsal. Two days later the Bugis attacked the lower stockade and were held up there, but the Pĕngĕrah of Pinang Sĕkayu went upstream from the mouth of the Nyawan-river to the Pangeran Adipati and Raden Jaga and informed them that they could not hold out longer, as the assailants were too strong in numbers, and the chiefs of the Dayaks of Mĕlinsam were going over to Pangeran Ĕmas Suria Nĕgara.

The Pangeran Dipati called the chiefs of the five Dayak-tribes and asked them whether they should flee or fight. He thought it would hardly be of use to fight, as they had already given up their stockades at Pinang Sĕkayu, and lost everything by the plundering of Pinang Sĕkayu and could not meet the further

expenses of the war. They could not rely on their Dayaks, and, besides, what would become of their wives and children in the jungle, who, if they continued fighting, would be attacked by the Dayaks of Landak, so that they could not leave them to themselves, and the Dayaks of Landak would be thirty to one against those of Mĕmpawah. The chiefs advised fleeing ere the Dayaks of Landak should come, and the Pangeran Dipati asked them whether he should join them or not, but the chiefs of the Dayaks said that they would not be able to leave their *tĕmbawang* (Dayak-villages?), and the Raja of Mĕmpawah would be their prince. The Pangeran Dipati thereupon fled with his family over Pabahan, Siri, Tĕmila, Sĕngah and Tayan to Mĕlio and settled there, his people being scattered, some at Pinang Sĕkayu, others in the *tĕmbawang* Sĕbau at the mouth of the Sumpa' river, and others at Tayan.

(A *shaër* describes the fighting and the taking of Pinang Sĕkayu. The ransacking of the palace is forbidden by the Yamtuan Muda).

After the victory Pangeran Ĕmas Suria Nĕgara called the chiefs of the Mĕmpawah-Dayaks to Pinang Sĕkayu, and the chiefs of thirty villages came to do homage to him. When they had promised that they and their descendants would acknowledge Pangeran Ĕmas Suria Nĕgara and his descendants as Pĕnĕmbahans of Sĕngkawo' and their chiefs, Pangeran Ĕmas ordered Andriguru Lĕmalo' to stand on the shore of the river, holding in his right hand a stone and in his left an egg. The Dayaks stood round him, and he told them to listen well to his words:—"This agreement between us and the prince shall hold good with all his descendants and our descendants, and cannot be renounced, and if the Dayaks sin against it, the Dayaks shall die." The Dayaks replied: "So be it," and he continued: "And if the (people who came over the) sea sin against it, the Dayaks shall die." One of the Dayaks replied: "You speak the truth, Pĕnglima Malo'" and the latter threw the stone into the river and broke the egg before the people. But the Dayaks said: "You erred, Pĕnglima; if the (people from the) sea sin against it, they are to die, and on no account are the Dayaks to die when the (people of the) sea sin against it; that word was wrong." The Pĕnglima replied: "If we do not like it, we can dive after that stone, and if we get it, we can alter the agreement." The chiefs of the Dayaks replied: "How can we dive after that stone which has sunk in a stream with such a strong current? Now of us will undertake to do that." The Pĕnglima said: "If so, then I made no mistake, and we are at fault (*jika bagitu kata kita bukanlah salah aku dan kita-lah yang salah*)." The chiefs of the Dayaks replied: "We leave the matter to the Raja, to whom we have given over ourselves like white yarn (to be dyed whatever colour he wants). If he cares for us, we shall live happily; if not, we shall be unhappy, and if we cannot bear it any longer, we

shall run away and try to find another prince who is able to take care of us." Pangeran Ĕmas Suria Nĕgara said: "Do not let us quarrel I and my descendants shall take good care of you, and shall not alter our covenant." He distributed presents amongst the chiefs, and they returned to their villages.

Dĕmang Rilaka Pĕnawuna Chia' then claimed punishment for the Dayaks of Salih, who had caused all the trouble, and suggested that they should capture as many of them as they could and carry them away as slaves. Pangeran Ĕmas Suria Nĕgara agreed, but those who ran away were to remain his people. A party under Dĕmang Rilaka went upstream and attacked the village at eight o'clock in the morning. They captured about thirty-five people, who by order of Pangeran Ĕmas Suria Nĕgara where brought to Sĕbukit and made Mohammedans. The plunder was very rich, as everything was taken away, even old sleeping mats and unclean animals, which were carried away by the Dayaks. The Dayak-village of Salih consisted of fifty doors and about two hundred and fifty inhabitants, who went down to Pinang Sĕkayu and did homage to the princes. Pangeran Ĕmas Suria Nĕgara gave order to return the day after the next, allowing the empty houses of Pinang Sĕkayu to be taken down and brought to Sĕbukit.

With singing and music the party returned to Sĕbukit, where they were welcomed with equal joy, and saffron-coloured rice, mixed with copper, silver and gold-coins, was scattered over the princes on their arrival at the Istana, to the delight of the children who were waiting at the palacedoor. A banquet was given for the victors in the audiencehall, concluded by prayers read by the Imam.

Soon the Yamtuan Muda of Riau and the Pangeran Mangkubumi of Sambas informed their brother that they wanted to return to their countries. The Pangeran Mangkubumi stated that by the younger sister of Sultan Aadil he had four children, a daughter Ĕmas Sani, daughter Ĕmas Saja, a son Daëng Buka, and a third daughter Ĕmas Utih. The Yamtuan Muda of Riau had two daughters by the younger sister of Sultan Sulaiman, Tĕngku Puteh and Tĕngku Hitam, and by another wife also two children, Raja Haji, who fell in the holy war, and a daughter Raja Halimah; the second daughter, Raja Aminah, was at that time not yet born. They wanted to make Pangeran Ĕmas Suria Nĕgara the Pĕnĕmbahan of Mĕmpawah. Pangeran Ĕmas replied, that his wife wanted them to stay for another week; Sultan Muhammad Zainu'ddin had already given Mĕmpawah to the Ratu Agung Sĕnuhun when they had left Matan, and there the matter had to rest. After a week of festivities the Yamtuan Muda and the Pangeran Mangkubumi left, accompanied by Pangeran Ĕmas Suria Nĕgara and his whole family, who made a fishing expedition of it. On a Monday, when the shadows were

sixteen feet long, they sailed, guns firing from ships and shore, music playing, and the whole like a bridal procession. At the mouth of the river the three brothers bade farewell, and the Yamtuan Muda returned to Riau, where sixteen guns were fired at his arrival. He then took care of the welfare of Riau, which was most famous and flourishing in 1150 A.H.

A.H. 1148 the Yamtuan Muda intended to go to Tepokan. When he halted at Tanjong Obin (Uban?), the Sultan called him and the Orang-Kaya Indra Bongsu back, as Raja Kĕchi' was attacking Riau again. They returned at once and stopped at Tanjong Pinang, sending out spies, who on the third day reported the sails of Raja Kĕchi' in the Straits of Tiung; this was on the first day of the month Safar. The Yamtuan Muda began the cannonade with the vessels he had with him, ordering Pĕnglima Bongsu to bring the fleet from the river to Sĕngkarang, in order to protect the trading-vessels, of which the river was full.

When Raja Kĕchi' reached Pĕnyĕngat, he found the Riau fleet waiting, stretching from Tanjong Pinang to Sĕngkarang. He stopped at Pĕnyĕgat and hold a council of war. His ministers whispered amongst themselves at the foolishness of the undertaking. The merchants and inhabitants of Riau flocked to Tanjong Pinang to see the fight and to bring provisions for the fleet; they brought tents with them and built huts, and many had their small children and music with them. Sultan Sulaiman and the Yamtuan Muda were very glad that the people took it so lightly. The warriors wanted to start fighting at once, but the Yamtuan Muda sent a letter to Raja Kĕchi', inviting him to commence at once with the play, as the shore was crowded with spectators who would be disappointed if they should not see the fighting between brothers and brothers-in-law, and would have incurred the expense of coming there and bringing all their provisions with them for nothing. If they should run short of provisions or ammunition, there was a plentiful store at Riau, where gunpowder was manufactured by tens of bamboo-vessels a day, and he would be glad to help Raja Kĕchi' with a boatful or two. Raja Kĕchi' went ashamed into his cabin, when the letter had been read to him, as he did not know what to do, and his ministers made various comments on it. The messenger returned and reported what he had seen and heard, and the Yamtuan Muda laughed. On the seventh day of the month Safar, when the sun was half up, the Yamtuan Muda had the war-drum sounded, and the fleet of Raja Kĕchi' started a tremendous cannonade. The Yamtuan Muda returned only one shot to ten of theirs, and ordered a vessel to move all guns from bows to stern, to turn round, and rowing backward, as if retreating, to fire on the enemy from the stern. Raja Kĕchi', much ashamed, ordered firing to cease. He returned to Pĕnyĕngat and refused to eat. His ministers were disgusted. They had been made fools of, had been shown the posteriors of the foe, and

thought it better to jump over board. Besides, they thought of the oath in the Mosque, and felt like pirates. They agreed to carry Raja Kĕchi' back by force if he would not return on his own account. Sultan Sulaiman and the Yamtuan Muda were greatly amused by Raja Kĕchi's running away first and then anchoring again. On the next morning, a Wednesday, they opened fire at a distance of *dua kali mandi pĕluru i.e.* a cannonball ricochetting twice before it reached its destination from Pĕnyĕngat. So they fought (as if in earnest), and people flocked to see. When Raja Kĕchi' saw that he was made a fool of again, he decided to return, but waited until night. On the night from Wednesday to Thursday he sailed back to Siak. Sultan Sulaiman and the Yamtuan Muda with Raja Indra Bongsu returned to Riau and held festivities, but three days later followed with their fleet to make sure that Raja Kĕchi' had returned to Siak, and then went back to Riau. Afterwards the Sultan went to Pahang and built a wall round the tomb of his father, going in the same year also to Trengganu. When he was there, a man from Tambĕlan, named Hitam, brought news that Raja Kĕchi' was sailing to Trengganu with sixty-two vessels. This news was received on a Saturday, the first day of Muharram A.H. 1149, and the Sultan had a stockade built at the mouth of the river. Shortly afterwards came Raja Indra-Bongsu, Daëng Kĕmboja and Enche Unta from Riau and requested the Sultan to return. The Sultan married Tun Abdulmajid to the daughter of the Bĕndahara (of Trengganu?) named Tun Inah. He returned to Riau on Saturday, the twenty-first day of Jumadi'l-akhir A.H. 1149, bringing the Yang di-pĕrtuan Kĕchi' with him. On Thursday, the 7th day of Dzulhajih, Raja Ibrahim was circumcised. Pĕnglima Bongsu brought the news that the 62 vessels had passed Batang. The Sultan and the Yamtuan Muda then, in fulfilment of their vows, went with their whole households to Pĕngujan, where two palaces had been built, close to a Kramat (sacred place). They moved into those palaces, and the high dignitaries built temporary huts there. Every day festivities and banquets weer held, fishing-stakes were built round Pĕngujan, and at low tide the royal ladies and children went to catch fish, heedless that their beautiful sarongs from Palĕmbang and Siantan got wet. The fish were cooked or curried. At night time the royal ladies amused themselves on the beach by moonlight. Hajis and Lĕbais prayed and praised God, their voices mingling with the music until midnight. Early in the morning the princes watched the sunrise, until it was time to join in morning-prayer. Prayers over, they had breakfast, and then the pious assembled at the sacred tomb and read prayers and the Koran, receiving rich rewards for their labour. They also prayed for long life and happiness for the princes, and a banquet was given to them. When all vows were fulfilled, the party returned to Riau, which became more and more famous, and a resort for merchants.

A.H. 1150 Riau was molested again by Raja Kĕchi', who sent his son, Raja Aalam, with Daëng Matekko and Raja Ĕmas to attack it. They arrived with a fleet of sixty vessels on the fifteenth day of the month Rabi-ul-awal and anchored at Tanjong Sĕbadam. As many merchant-vessels as could find place in the river sailed up, but the bigger ships had to stay in the roads. Sultan Sulaiman and the Yamtuan Muda collected their men, and Enche Kalang and Pĕnglima Bongsu were sent with two war-vessels to reconnoitre. They met the fleet of Raja Aalam at Tanjong Sĕbadam, but their ships were blown ashore by a storm from the Straits and could not be got off. After a short fight the two men managed to escape upstream, but their ships were taken by the enemy. Raja Aalam went further upstream, but was held up by the Riau fleet, which had come to the barrier closing the mouth of the Payung-river. The fight began, wherein also the guns of Kota Rintang took part. Raja Aalam could not proceed further. None of the men of Riau were killed or wounded. Raja Aalam went back to Kampong Bulang, built a stockade there and out of some junks made a floating fort, which he made fast with chains in the sea near Kampong Bulang, whilst he directed his campaign against the Sungai Tarum, where, however, he was not very successful

The Sultan and the Yamtuan Muda had a number of war-vessels and canoes towed through the left branch of the river to relieve Tarum. The Yamtuan Muda himself led the attack, and the men of Siak fled, leaving three of their ships behind. After a short pause a general attack was made from Tarum downstream to Tanjong Sĕbadam, as there were many ships and stockades of the enemy on and along the river. At the time of the morning-prayer on Wednesday, the seventeenth day of Rabi-ul-akhir A.H. 1150, the attack began, and with the help of God all stockades and many ships were taken, and in the night, at the time of the evening-prayer, Raja Aalam, Daëng Matekko and Raja Ĕmas fled, nobody knows where, leaving behind a great number of ships and guns.

A *shaër* follows, describing the events from the return of the Yamtuan Muda from Mĕmpawah to this last war.

The book concludes with a *shaër* praising the five brothers, whose advance in the world was solely due to their following the right faith in the right way and to their unity and brotherly love, and exhorting their descendants to follow their example.

This (copy, from which the book was printed?) was written by Haji Abdullah, the son of Khairu'd-din, a native of Juanah, on the twenty-seventh day of the month Shaaban A.H. 1282, a Sunday.

# The size of Trees in the Malay Peninsula.

*By* F. W. Foxworthy.

None of our trees approach the dimensions of the "big trees" of North America, nor do they equal the largest trees of the Australian region. They do, however, approach fairly closely the dimensions of the largest trees found in other parts of the eastern tropics.

**Height.**—The accurate measurement of the height of large trees presents some difficulty and careful instrumental determinations of the height of our trees are few. It often happens that a large tree standing in the open is credited with great height, often with as much as a hundred feet more than it possesses. Experienced observers may make a mistake of thirty or more feet in a visual estimate of height, and the error made by inexperienced observers is likely to be much greater. Certain of our large trees have been, by some persons, stated to be much more than 300 feet in height. Such statements lack verification, and are probably the result of careless estimate by inexperienced observers. The only way to determine the height of a tree accurately is by the use of instruments of precision, if the tree is standing, or by direct measurement of felled trees.

The tallest tree thus far recorded from the Peninsula was a Tualang (*Koompassia excelsa* Taub.), which was 265 feet in height. The tree was measured by B. F. H. Barnard, Deputy Conservator of Forests, with the aid of a hypsometer. Tualang often reaches large size and certain individuals of this species, in Sarawak, have been recorded as reaching a height of 275 feet.

The next tallest tree which has been recorded is a Kapur (*Dryobalanops aromatica* Gaertn. f.), whose height was 220 feet. Jelutong (*Dyera* spp.) sometimes reaches a height of 200 feet, and there are, perhaps, a few other kinds of trees which occasionally reach that height, although definite records are lacking.

Forest officers measure a great many trees, but the total height is not often recorded, because total height is of much less importance than the diameter and the height to the first branch, as these are the measurements used in calculating the volume of useful timber in the tree, and also because the total height can rarely be determined with accuracy in the forest, with the time and equipment available. The best opportunity for determining the heights of numbers of trees comes when felling is going on, and quite a number of measurements have been made at such times. It may be stated, as a result of measurements that have been made, that the average height of the top of the forest canopy

is a little more than 150 feet. Here and there certain very large trees project for some distance above this level. The height to the first branch is, in most cases, less than 100 feet, but there are a few kinds of trees, such as Keruing (*Dipterocarpus* spp.) and Kapur (*Dryobalanops aromatica* Gaertn. f.), which usually exceed 100 feet to the first branch when mature. A number of other kinds of trees have occasional individuals which are more than 100 feet to the first branch.

**Diameter and girth.**—The measurement of the thickness of a tree is made at breast height (4½ feet above the ground), except when there are buttresses, when it is made above these. Diameter is usually measured with the aid of callipers, except in the case of very large trees, when the girth is taken with a tape. The largest tree recorded in the Peninsula is a Chengal (*Balanocarpus Heimii* King) in the Parit Forest Reserve, Kinta District, Perak. This tree was 40 feet five inches in girth (154 inches in diameter) and was estimated to be 125 feet to the first branch.

The following table shows the average diameters of the different trees, as recorded in valuation surveys during the last five years. All trees over 12 inches in diameter have been recorded, when a survey was made. The last column of the table gives the maximum diameter recorded for the tree, whether in valuation surveys or elsewhere. Measurements have been made in most of the states of the Peninsula, and the table represents our present knowledge of the size of our trees. The class recorded as "Miscellaneous" contains all trees not separately named and includes a very large number of forms, most of them small.

TABLE OF SIZES OF TREES.

| Tree | Total Trees measured. | Average diameter inches. | Maximum diameter inches. |
|---|---|---|---|
| MERANTI—Shorea spp. .. .. | 19,041 | 24 | 88 |
| KELAT—Eugenia spp. .. .. | 10,461 | 16 | 46 |
| KERUING—Dipterocarpus spp. .. | 8,572 | 26 | 78 |
| KEMPAS—Koompassia malaccensis .. | 4,220 | 24 | 83 |
| MEDANG—various Lauraceae .. | 3,865 | 18 | 48 |
| MEMPENING—Quercus spp. .. .. | 3,268 | 16 | 52 |
| RESAK—Shorea spp., Hopea spp., etc. | 3,020 | 22 | 84 |
| KAPUR—Dryobalanops aromatica .. | 2,862 | 28 | 134 |
| KERANJI—Dialium spp. .. .. | 2,360 | 20 | 52 |
| MERAWAN—Hopea spp. .. .. | 1,754 | 18 | 42 |
| BINTANGOR—Calophyllum spp. .. | 1,461 | 16 | 32 |
| PETALING—Ochanostachys amentacea | 1,418 | 16 | 35 |
| NYATOH—Palaquium spp., etc. .. | 1,338 | 18 | 46 |
| CHENGAL—Balanocarpus Heimii .. | 1,261 | 34 | 154 |
| KELEDANG—Artocarpus lanceaefolia | 1,165 | 20 | 56 |

| Tree | Total Trees measured. | Average diameter inches. | Maximum diameter inches. |
|---|---|---|---|
| MERBAU—Intsia spp. .. .. .. | 1,129 | 26 | 87 |
| SEPETIR—Sindora spp. .. .. | 920 | 22 | 54 |
| RENGAS—Melanorrhoea spp., etc. .. | 916 | 20 | 46 |
| MENGKULANG—Tarrietia spp. .. | 818 | 22 | 46 |
| JELUTONG—Dyera spp. .. .. | 608 | 26 | 100 |
| SIMPOH—Dillenia spp., Wormia spp. | 524 | 20 | 38 |
| SERAYA—Shorea Curtisii .. .. | 471 | 32 | 80 |
| KULIM—Scorodocarpus borneensis .. | 447 | 18 | 59 |
| MERSAWA—Anisoptera spp. .. .. | 358 | 34 | 88 |
| PENAGA—Mesua ferrea .. .. | 355 | 18 | 28 |
| TUALANG—Koompassia excelsa .. | 349 | 40 | 107 |
| KELADAN—Dryobalanops oblongifolia | 319 | 24 | 54 |
| DURIAN DAUN—Durio spp. .. .. | 303 | 22 | 42 |
| KAYU ARANG—Diospyros spp. .. | 215 | 16 | 28 |
| KAMAP—Strombosia rotundifolia .. | 190 | 16 | 34 |
| KUNGKUR—Pithecolobium confertum | 167 | 16 | 34 |
| BETIS—Payena utilis .. .. .. | 165 | 26 | 69 |
| TERENTANG—Campnosperma spp. .. | 161 | 22 | 38 |
| TEMPINIS—Sloetia sideroxylon .. | 140 | 18 | 25 |
| BERANGAN—Castanopsis spp. .. | 127 | 18 | 35 |
| TEMBUSU—Fagraea gigantea .. | 119 | 22 | 61 |
| MERANTI PAHANG—Shorea spp. .. | 113 | 28 | 71 |
| BUNGOR—Lagerstroemia spp. .. | 89 | 18 | 39 |
| PUNGGAI—Coelostegia Griffithii .. | 62 | 20 | 44 |
| DEDALI—Strombosia javanica .. | 55 | 18 | 48 |
| DAMAR HITAM—Balanocarpus spp. .. | 44 | 24 | 28 |
| LEBAN—Vitex spp. .. .. .. | 44 | 16 | 18 |
| GERONGGANG—Cratoxylon arborescens | 30 | 18 | 38 |
| MISCELLANEOUS .. .. .. | 47,585 | 18 | .. |
| Total trees measured .. .. .. | 122,952 | .. | .. |

## Spolia Mentawiensia.

### Dermaptera.

*Par le Dr.* ALFREDO BORELLI,
(*Museo Zoologico, Torino*).

(Figs. 1, 2).

With an Introduction by C. BODEN KLOSS,
*Director of Museums,*
*Straits Settlements and Federated Malay States.*

### i. Introduction.

The Mentawi Group, to the west of Sumatra, consists of the islands of Siberut, Sipora, and North and South Pagi. The first and northernmost is larger than the other three (which are fairly equal in size) put together.

Little was known of their entomology until I visited Siberut and Sipora during September—November 1924, accompanied by Mr. N. Smedley, Assistant Curator of the Raffles Museum, Singapore, and Dr. H. H. Karny, Assistant Entomologist, Zoological Museum, Buitenzorg, Java, with a party of native collectors. I have, as usual, to thank the Government of Netherlands India for the assistance and facilities afforded.

The islands are not very pleasant collecting grounds: they are mostly swamp out of which rise hills nowhere more than 500 metres high and generally difficult to get at, being surrounded by soft ground. The sago palm is common. The native villages are situated on the banks of rivers some distance upstream, and there are scarcely any paths except those made by the Dutch military posts: these are generally through flat land and are often untraversable owing to floods. There is much rain throughout the year. The islands are unhealthy: in spite of systematic employment of quinine and other precautions, all the members of a party of fifteen, except myself, suffered from malaria either on the islands or soon after leaving them.

The group lies parallel to the west coast of Sumatra and about 90-110 kilometres distant. Siberut is about 110 kilometres long and about fifty broad, and its northern extremity is on Lat. 1° South.

The islands are apparently connected with each other by a sea-bottom of less than 200 metres and most bathygraphical charts show a connection with Sumatra, via the Batu Islands to the north-east, by a narrow ridge of similar soundings; but I am inclined to doubt that this ridge is unbroken as indicated, for the faunas of the groups differ greatly, while, though the Mentawi Islands possess a much richer mammalian fauna than the undoubtedly deep-water islands of Simalur and Engano at the extremities of the West Sumatran chain of islands, the fauna is much more peculiar and differentiated than that of Nias Island, also represented as being within the one hundred fathom line. Whatever the depths may be, they certainly are not those of the shallow Sunda shelf (less than 75 metres) on which stand almost all the land-masses of Malaysia, *i.e.*, the Peninsula, Sumatra, Java, Bali, Borneo, etc.

Apart from the doubtful connecting ridge the group is surrounded by depths of 200-1000 metres of water; further, everywhere directly between it and Sumatra lies the long Mentawi Basin with depths of 1000-2000 metres. Such conditions render several of the West Sumatran Islands, in spite of small size and lack of height, zoologically quite as distinct from each other and from the rest of Malaysia as the larger areas of that sub-region are from each other.

The islands are forested all over save for the natives' plantations, and our material was obtained from varied localities near the Government stations of Siberut, in the island of that name,

and Sioban in Sipora: it came from the sea-shore, low-lying ground, the swamps, cultivated areas, and from such hills as were accessible.

During the journey to and from the islands we also made small collections of insects at Padang, West Sumatra; on Pulau Tello, one of the shallow-water Batu Islands to the north of Siberut; and on the Pagi Islands where Dr. Karny spent several days.

As reports on the various collections obtained are prepared they will be published in various journals under the general title "Spolia Mentawiensia."

The following have appeared to date:—

Spolia Mentawiensia: Flora. H. N. Ridley, Kew Bulletin of Miscellaneous Information, No. 2, 1926, pp. 56-94.

Spolia Mentawiensia: Birds. F. N. Chasen and C. Boden Kloss, Ibis, 1926, pp. 269-305. Plate III and fig. 10.

Spolia Mentawiensia: Reptiles and Amphibians. Malcolm A. Smith, Ann. and Mag. Nat. Hist. (9) 18, 1926, pp. 76-81.

Spolia Mentawiensia: Zoraptera. H. H. Karny, Treubia, IX, 1926, pp. 1-5, pl. 1, text figs. 1-3.

### ii. Systematic.

*Diplatys karnyi* nov. sp. (Siberut).

*Nesogaster gonophygius* nov. sp. (Siberut).

### iii. Dermapteres des Iles Mentawi.

Depuis les quelques espèces recueillies par le Dr. Elia Modigliani et conservées dans les collections du Musée civique de Gênes, personne que je sache, n'a fait des recherches de Dermaptères dans les îles Mentawi. Aussi est-ce avec plus grand interêt que j'ai examiné le matériel réuni par le Musée Raffles de Singapore et le Musée Zoologique de Buitenzorg au cours d'une excursion faite dans les îles Siberut et Sipora pendant les mois de Septembre et Octobre 1924. Cette collection comprend 22 espèces dont 2 nouvelles.

Des 19 espèces déjà connues la seule *Tagalina semperi* Dohrn, n'a été rencontrée jusqu'à présent ni à Sumatra ni à Java, les autres sont pour la plupart communes à tout l'archipel Malais. Toutefois *Parapsalis laevis, Gonolabidura piligera* et *Chaetospania lanceolata* signalées de Sumatra et des Philippines n'ont pas encore été rencontrées à Java et *Proreus delicatulus* décrit de Ceylan n'a été retrouvée qu'à Sumatra.

Des espèces rapportées des îles Mentawi par le Dr. Modigliani: *Allostethus indicum* var. *minor* (Borm.), *Allostethella doriae* (Borm.), *Spongovostox stella* (Borm.), *Chaetospania feae* (Borm.), *Chelisoches variopictus* (Borm.), *Chelisoches superba* (Dohrn) et

*Narberia simplex* (Borm.) aucune n'a été retrouvée par l'expedition du Musée Raffles ni par le docteur Karny du Musée Buitenzorg qui l'accompagnait.

## PROTODERMAPTERA.

Fam. **Pygidicranidae.**

Subf. **Diplatynae.**

Gen. **Diplatys** Serville.

**Diplatys karnyi** nov. sp.

Tête d'un brun chocolat avec la moitié antérieure du clypeus jaune pâle, la lèvre supérieure brun testacé, les palpes bruns à la base d'un jaune pâle à l'extrémité. Front bombé, bien distinct de l'occiput déprimé et étroit qui présente un court sillon médian et est rebordé le long du bord postérieur; sutures indistinctes crêtes oculaires marquées et de moitié plus courtes que le diamètre longitudinal des yeux, très gros et convexes. Antennes de 21 articles, le 1er brun, de la couleur de la tête, les suivants d'un jaune testacé ou olivâtre.

Pronotum plus court que la tête, à peu-près aussi long que large dans le tiers antérieur puis allant se rétrécissant fortement jusqu'au bord postérieur qui est de peu supérieur à la moitié de sa plus grande largeur. Bombé, de la couleur de la tête et traversé par un sillon médian longitudinal dans sa moitié antérieur; jaune pâle et déprimé dans la moitié postérieur, bords latéraux convergents et presque droits ornés de poils marrons, angles et bord postérieurs fortement arrondis.

Ecusson jaune pâle.

Elytres presque trois fois aussi longues que le pronotum, d'un brun foncé, arrondies postérieurement.

Ailes longues comme le tiers des élytres, d'un brun testacé ornées d'une tache jaune dans la moitié antérieure interne.

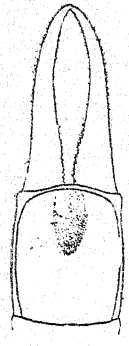
Pattes d'un jaune fauve, les fémurs de la première paire ornés d'une petite tache d'un brun noirâtre sur la face antérieure, près de l'articulation avec les tibias; 1er article des tarses un peu plus long que la somme des deux suivants.

Abdomen cylindrique; les segments étroits à bords parallèles du 1er au 8e, allant s'élargissant faiblement du 8e au dernier dont la largeur est à peine égale à une fois et un tiers celle du 1er; plis tuberculaires des 3e et 4e segments bien marqués. D'un roux ferrugineux passant au marron rougeâtre dans les derniers segments, ornés d'une pubescence jaunâtre. Dernier segment rectangulaire, a peu-près aussi long que large; bombé et pourvu d'un léger sillon médian longitudinal, déclive dans le tiers postérieur,

avec une impression médiane circulaire en relief contre le bord postérieur, celui-ci rebordé et légèrement concave entre les racines de la pince, obliquement tronqué sur les côtés.

Segments sternaux testacés.

Segments inférieurs de l'abdomen testacés. Penultième segment un peu plus long que large avec les côtés droits et parallèles dans la première moitié, puis légèrement arrondis et convergents jusqu'au bord postérieur coupé droit avec les angles postérieurs faiblement arrondis. Sa surface opaque et légèrement convexe présente une longue dépression ovale qui occupe la moitié postérieure du segment (fig. 1)..



Branches de la pince d'un roux fauve; subcontigues à la base, droites et triquètres, faiblement dilatés et finement crénelées internement dans le premier tiers de leur longueur, puis cylindriques lisses et se courbant légèrement jusqu'aux pointes aigues qui se rencontrent.

Longueur du corps ♂ 11.5 millim.

Longueur de la pince ♂ 2.3 millim.

Espèce qui par la forme de l'abdomen et de la pince rappelle *Diplatys jacobsoni* Burr de Batavia dont elle diffère par la taille, deux fois plus grande, par la couleur du pronotum et par la forme du pénultième segment ventral qui se rapproche de celle de *D. greeni* Burr.

Siberut (îles Mentawi), Septembre 1924 (H. H. Karny): 1 ♂.

**Diplatys greeni** Burr.

Siberut, Septembre 1924 (C. B. K. et N. S.): 1 ♀.

Cet exemplaire correspond exactement à la fig. 2 donnée par Malcolm Burr (*D. nigriceps*, Journ. Bombay Nat. Hist. Soc. XIV, p. 75, Pl. A, fig. 1-3, 1901).

Subf. **Pygidicraninae.**

Gen. **Tagalina** Dohrn.

**Tagalina semperi** Dohrn.

Sipora, Octobre 1924 (C. B. K. et N. S.): 1 ♀ et une larve.

Siberut, Septembre et Octobre 1924 (H. H. K.): 1 ♀, 1 nymphe ♂, 1 larve.

Sipora, Octobre 1924 (H. H. K.): 1 nymphe.

Gen. **Kalocrania** Zacher.

**Kalocrania marmoricrura** Serville.

Siberut (West Sumatra), Septembre 1924 (C. B. K. et N. S.): 1 nymphe ♂.

Fam. **Labiduridae.**

Subf. **Allostethinae.**

Gen. **Gonolabidura** Zacher.

**Gonolabidura piligera** Borm.

Sipora, Octobre 1924 (C. B. K. et N. S.): 1 ♂.

Subf. **Psalinae.**

Gen. **Parapsalis** Borelli.

**Parapsalis laevis** Borelli.

Siberut, 23 Septembre 1924 (H. H. K.) 1 larve.

## PARADERMAPTERA.

Fam. **Apachyidae.**

Gen. **Apachyus** Serv.

**Apachyus chartaceus** Haan.

Sipora, Octobre 1924 (C. B. K. et N. S.): 1 ♀.

## EUDERMAPTERA.

Fam. **Labiidae.**

Subf. **Nesogastrinae.**

Gen. **Nesogaster** Verh.

**Nesogaster amoenus** Stal.

Sipora Octobre 1924 (C. B. K. et N. S.): 1 ♀ de la forme dépourvue d'écaille alaire.

**Nesogaster gonopygius** nov. sp.

Tête plus longue que large, peu bombée, d'un jaune orangé avec la lèvre supérieure et les palpes testacés. Sutures fines mais distinctes. Antennes de 11 articles, les 5 premiers d'un jaune testacé, bruns du 6e au 8e, les 3 derniers blanchâtres.

Pronotum rectangulaire avec le bord et les angles postérieurs légèrement arrondis; un peu plus court que la tête et à peine plus long que large; d'un brun marron foncé, jaune testacé le long des bords latéraux.

Elytres brunes avec reflets pourprés, ornées d'une tache jaune sur les angles huméraux; d'une longueur presque double de celle du pronotum qu'elles débordent sensiblement de chaque côté; angles huméraux arrondis; côtés droits, parallèles, bord postérieur droit.

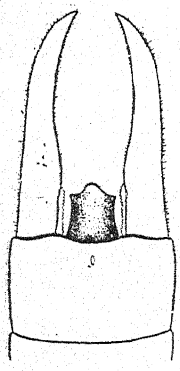
Ailes saillantes, de longueur égale à celle du pronotum, brunes avec une tache jaune dans le tiers basal externe.

Pattes d'un jaune pâle, les fémurs de la 1er paire entièrement bruns, ceux de la 2e et de la 3e paire bruns dans la moitié basale.

Abdomen d'un roux fauve, luisant; plis tuberculaires des 2e et 3e segments bien distincts. Dernier segment brun foncé dans la moitié postérieure, rectangulaire, plus large que long, faiblement convexe avec le bord postérieur sensiblement rebordé.

Pygidium brun testacé, saillant, plus long que large, convexe en dessus, rectangulaire avec les bords latéraux parallèles et le bord postérieur saillant en son milieu en forme de triangle émoussé (fig. 2).

Branches de la pince d'un brun fauve avec les pointes plus foncées; écartées a la base, convexes, droites et presque parallèles dans les deux premiers tiers de leur longueur, puis faiblement courbées en dedans et allant s'amincissant jusqu'aux pointes, creusées et finement dentelées en dedans le long du pygidium, puis lisses.



Pénultième segment ventral plus large que long, rectangulaire avec le bord postérieur faiblement arrondi.

Longueur du corps ♂ : 4.5 millim.

Longueur de la pince ♂ : 1.6 millim.

Siberut, Octobre 1924, ♂ et ♀ (H. H. K.).

Espèce voisine de *N. mouseyi* Burr des îles Philippines, le pygidium non tranqué postérieurement et l'absence d'épine avant la seconde moitié des branches de la pince l'en distinguent desuite, ainsi que la coloration différente des antennes et des élytres.

Subf. **Spongiphorinae.**

Gen. **Spongovostox** Burr.

**Spongovostox semiflavus** (Borm.).

Siberut, Septembre 1924, 1 ♀ (C. B. K. et N. S.).

Subf. **Lobiinae.**

Gen. **Chaetospania** Karsch.

**Chaetospania lanceolata** Borelli.

Res biologicae, Vol. I, No. 5, fig. 6, Torino 1926.

Siberut, Octobre 1924, ♂ et ♀ (H. H. K.).

Des exemplaires de cette espèce provenant des îles Philippines ainsi que d'autres recueillis à Lampongs (Sumatra) par le Dr. Karny avaient été rapportés dans une note précédente* à la *Chaetospania quadrata* Burr.

Gen. **Labia** Leach.

**Labia curvicauda** Motsch.

Sipora, 9 Octobre 1924 (H. H. K.): 1 ♀.

var. **flavicollis** Borm.

Sipora, 26 Octobre 1924 (H. H. K.): 1 ♀.

**Labia pilicornis** Motsch.

Siberut, Septembre 1924 (H. H. K.): Plusieurs exemplaires ♂ et ♀.

Gen. **Prolabia** Burr.

**Prolabia arachidis** (Yersin).

Sipora, Octobre 1924 (H. H. K.): Larve.

Subf. **Sparattinae.**

Gen. **Auchenomus** Karsch.

* Boll. Mus. Zool. ed Anat. comp. Torino, Vol. 38, n.s. No. 13, pag. 11: 1923, Treubia, VIII, p. 262, 1926.

**Auchenomus javanus** Borm.

Pulau Tello, îsles Batu, Novembre 1924 (H. H. K.): ♂ et ♀.

Fam. **Chelisochidae.**

Subf. **Chelisochinae.**

Gen. **Chelisoches** Scudder.

**Chelisoches morio** Fabr.

Siberut, Septembre 1924 (C. B. K. et N. S.): 2 ♀.

**Chelisoches semirufus** Borelli.

Res biologicae, Vol. I, No. 1, p. 7, fig. 7, 7a, 8. Torino 1926.

Sipora et Siberut, Septembre et Octobre 1924.

Plusieurs exemplaires ♂ et ♀ recueillis par les Musées Raffles et Buitenzorg; les seuls exemplaires connus.

Gen. **Proreus** Burr.

**Proreus delicatulus?** Burr.

Siberut, Septembre 1924, 1 ♀ (C. B. K. et N. S.).

Exemplaire que je rapporte avec beaucoup de doute à cette espèce à cause de la différence de couleur des élytres et des pattes. Elytres d'un marron rougeâtre ornées d'une tache jaune qui occupe le milieu de la moitié antérieure; légèrement ponctuées. Pattes brunes avec les tarses testacés. Un exemplaire ♀ présentant les mêmes particularités de coloration, provenant de Lampongs (Sumatra) m'avait déja été communiqué par le Dr. Karny (v. Borelli, Treubia, VIII, p. 268, 1926).

Gen. **Hamaxas** Burr.

**Hamaxas feae** Borm.

Sipora, Octobre 1924: 1 ♂ et 3 ♀ (C. B. K. et N. S.).

L'exemplaire ♂ diffère de la description originale de de Bormans et de la figure donnée par Malcolm Burr, dans son étude sur Dermaptères de l'Inde en ce qu'il présente, le long de l'arête interne des branches de la pince, deux dents dont l'une, plus grosse, située au tiers, l'autre au-delà du second tiers de leur longueur, les deux épines reliées par une légère saillie du bord inférieur des branches; l'exemplaire typique présente une seule dent.* Des exemplaires présentant la même particularité ont d'ailleurs été signalés des îles Philippines, de Borneo et de Sumatra.

**Hamaxas semiluteus** Borm.

Sipora, Octobre 1924 (C. B. K. et N. S.): 1 ♂.

Siberut, Septembre 1924 (H. H. K.): 1 ♀.

Fam. **Forficulidae.**

Subf. **Anechurinae.**

Gen. **Allodahlia** Burr.

**Allodahlia scabriuscula** Serville.

Sipora, Octobre 1924 (C. B. K. et N. S.): 2 ♂, 4 ♀ et larves.

* Malcolm Burr, in: The Fauna of British India. Dermaptera. London, 1910, Pl. IX, fig. 88.

# Spolia Mentawiensia: Fulgoroidea, Homoptera.

## (Cixiidae, Meenoplidae, Delphacidae, Derbidae).

*By* F. Muir.

*Hawaiian Sugar Planters' Experimental Station, Honolulu, T. H.*

(Figures 1-34).

With an Introduction by C. Boden Kloss,

*Director of Museums,*
*Straits Settlements and Federated Malay States.*

i. Introduction.
ii. Systematic.
iii. Account of the Collection.

### i. Introduction.

The Mentawi Group, to the west of Sumatra, consists of the islands of Siberut, Sipora, and North and South Pagi. The first and northernmost is larger than the other three (which are fairly equal in size) put together.

Little was known of their entomology until I visited Siberut and Sipora during September-November 1924, accompanied by Mr. N. Smedley, Assistant Curator of the Raffles Museum, Singapore, and Dr. H. H. Karny, Assistant Entomologist, Zoological Museum, Buitenzorg, Java, with a party of native collectors. I have, as usual, to thank the Government of Netherlands India for the assistance and facilities afforded.

The islands are not very pleasant collecting grounds: they are mostly swamp out of which rise hills nowhere more than 500 metres high and generally difficult to get at, being surrounded by soft ground. The sago palm is common. The native villages are situated on the banks of rivers some distance upstream and there are scarcely any paths except those made by the Dutch military posts: these are generally through flat land and are often untraversable owing to floods. There is much rain throughout the year. The islands are unhealthy: in spite of systematic employment of quinine and other precautions, all the members of a party of fifteen, except myself, suffered from malaria either on the islands or soon after leaving them.

The group lies parallel to the west coast of Sumatra and about 90-130 kilometres distant. Siberut is about 110 kilometres long and about fifty broad, and its northern extremity is on Lat. 1° South.

The islands are apparently connected with each other by a sea-bottom of less than 200 metres, and most bathygraphical charts show a connection with Sumatra, via the Batu Islands to the north-east, by a narrow ridge of similar soundings; but I am inclined

to doubt that this ridge is unbroken as indicated, for the faunas of the groups differ greatly, while, though the Mentawi Islands possess a much richer mammalian fauna than the undoubtedly deep-water islands of Simalur and Engano at the extremities of the West Sumatran chain of islands, the fauna is much more peculiar and differentiated than that of Nias Island, also represented as being within the one hundred fathom line. Whatever the depths may be, they certainly are not those of the shallow Sunda shelf (less than 75 metres) on which stand almost all the land-masses of Malaysia, *i.e.*, the Peninsula, Sumatra, Java, Bali, Borneo, etc.

Apart from the doubtful connecting ridge the group is surrounded by depths of 200-1000 metres of water; further, everywhere directly between it and Sumatra lies the long Mentawi Basin with depths of 1000-2000 metres. Such conditions render several of the West Sumatran Islands, in spite of small size and lack of height, zoologically quite as distinct from each other and from the rest of Malaysia as the larger areas of that sub-region are from each other.

The islands are forested all over, and our material was obtained from varied localities near the Government stations of Siberut, in the island of that name, and Sioban in Sipora: it came from the sea-shore, low-lying ground, the swamps, cultivated areas, and from such hills as were accessible.

During the journey to and from the islands we also made small collections of insects at Padang, West Sumatra; on Pulau Tello, one of the shallow-water Batu Group to the north of Siberut; and on the Pagi Islands where Dr. Karny spent several days.

As reports on the various collections obtained are prepared they will be published in various journals under the general title "Spolia Mentawiensia."

The following have appeared to date:—

Spolia Mentawiensia: Flora. H. N. Ridley, Kew Bulletin of Miscellaneous Information, No. 2, 1926, pp. 56-94.

Spolia Mentawiensia: Birds. F. N. Chasen and C. Boden Kloss, Ibis, April 1926, pp. 269-305. Plate iii and Fig. 10.

Spolia Mentawiensia: Reptiles and Amphibians. Malcolm A. Smith, Ann. and Mag., Nat. Hist. (9) XVIII, 1926, pp. 76-81.

**ii. Systematic.**

*Andes siberutensis* sp. nov. (Siberut Id.)
*Mnemosyne fuscinervis* sp. nov. (Sipora Id.)
*Oliarus angusticeps* sp. nov. (Sipora Id.)
*Myndus dubius* sp. nov. (Siberut Id.)
*Ostama junctissima* sp. nov. (Siberut Id.)

*Malaxa bispinnata* sp. nov. (Sipora Id.)
*Ugyops insularis* sp. nov. (North Pagi Id.)
*Dicranotropis insignis* sp. nov. (Siberut Id.)
*Neocyclakara flaveola* sp. nov. (Siberut Id.)
*Kamendaka opacipennis* sp. nov. (Siberut Id.)
*Kamendaka karnyi* sp. nov. (Sipora Id.)
*Megatropis karnyi* sp. nov. (Sipora Id.)
*Megatropis siberutensis* sp. nov. (Siberut Id.)
*Megatropis simplex* sp. nov. (Siberut Id.)
*Mysidiodes multimaculata* sp. nov. (Sipora Id.)
*Rhotana bicolor* sp. nov. (Sipora Id.)
*Rhotana semipalinus* sp. nov. (Sipora Id.)
*Pamendanga siporensis* sp. nov. (Sipora Id.)
*Pamendanga rubicunda* sp. nov. (Sipora Id.)
*Pamendanga diffusa* sp. nov. (North Pagi Id.)
*Zoraida smedleyi* sp. nov. (Siberut Id.)
*Zoraida karnyi* sp. nov. (Siberut Id.)
*Zoraida padangensis* sp. nov. (West Sumatra)
*Pseudohelcita nitida* sp. nov. (Sipora Id.)
*Zeugma elegans* sp. nov. (Sipora Id.)
*Zeugma karnyi* sp. nov. (Siberut Id.)

### iii. Account of the Collection.

Cixiidae, Meenophidae, Delphacidae, Derbidae.

The collection dealt with in this paper was received from Mr. C. Boden Kloss, Director of the Raffles Museum, Singapore, and was made mostly by Dr. H. H. Karny in the Mentawi Islands off the west coast of Sumatra. Very little was known of the Fulgorids of these islands and so the present collection is of great interest. The island of Nias, to the north of the Mentawi group is much better known and the high endemism there justified us in expecting a similar high percentage of endemic insects in the southern islands. So very little is known of the Fulgorids of Sumatra that it is difficult to draw any conclusions at present. Of the thirty-six species dealt with twenty-six have been treated as new to science, one unidentified and nine as occurring in other places. Of these latter there appears to be more connection with Borneo than elsewhere, but a better knowledge of the Sumatra Fulgorids is very desirable. The new species are all related to other Malaysian species. In the following pages each collector's initials are attached to the specimens obtained by him.

## CIXIIDAE.

### Andes Stål.

1. **Andes siberutensis** sp. nov. Fig. 1.

Male: length 3 mm.; tegmen 4.5 mm.

Stramineous or light brown, a series of darker marks on genae and sides of vertex, a few minute dark specks on lateral portions of pronotum, darker over mesonotum with slightly darker brown

over lateral carinae; two small dark bands on first femora and a very indistinct one on second. Tegmina hyaline, slightly opalescent, a stramineous mark from base to middle of clavus and then across tegmen to middle of costa, the borders of this area with darker broken area, a dark mark at apex of clavus, mottled with light brown in apical cells; veins same color as membrane, with many brown granules, smaller and more numerous over apical half. Wings hyaline, slightly opaque and slightly fuscous, veins fuscous.

Genitalia figured; the apex of periandrium on ventral aspect produced into four long, curved spines joined together at base into a plate, the dorsal aspect produced into a short, thick spine and one long and slender spine. Apex of anal segment round, slightly curved ventrad.

Described from two males from Siberut (H. H. K. 9. ix. 1924).

There is a very dark female from Sipora which may be the female as that sex is generally the darker in this genus. This species comes near to *Andes trispinosus* Muir.

There is a large dark female which I do not feel disposed to name without the male.

**Kirbyana** Distant.

2. **Kirbyana javana** Muir. Fig. 2.

One male specimen from Sipora )H. H. K. 25. ix. 1924).

This species was originally described from a single female from Java; the present specimen agrees with it in build and colour and only a male from the type locality can tell whether this be a wrong identification. The genitalia are figured.

**Mnemosyne** Stål.

This is a tropicopolitan genus. The faces of the species are somewhat alike but the male genitalia are very different.

3. **Mnemosyne fuscinervis** sp. nov. Figs. 3, 4.

Male: Length 6.3 mm.; tegmen 6.7 mm.

Five distinct mesonotal carinae. Vertex longer than broad, apex round, much wider than base, lateral margins obarcuate (concave), oblique carinae joining lateral margins slightly anterior of middle, base angularly emarginate; medio-longitudinal carinae of frons and clypeus distinct, median ocellus forming a scar but not interrupting carina. M with five apical veins, M1, 2, 3, 4, 4*a*.

Genitalia figured; the aedeagus much more simple than is usual in the genus, the penis and periandrium but little differentiated; when at rest the genital styles meeting all along the inner margins.

Head and pronotum light brown, the latter slightly the darker, mesonotum and tegulae much darker brown, legs light brown, abdomen darker brown. Tegmina hyaline, veins dark brown, apical veins lighter than rest; clavus dark brown, opaque,

extending into corium, a dark brown patch at apex of Sc and R, R and M1, M4 and 4a and Cu, the rest of tegmina slightly fuscous or yellowish; veins with distinct granules bearing dark macrochaetae, a number of dark granules bearing dark macrochaetae in middle of cells both on basal and apical cells. Wings hyaline slightly fuscous, with dark brown veins.

Female: length 6.2 mm.; tegmen 7.3 mm.

In general build similar to male. Ventral view of ovipositor figured; pygofer wider than long, subovate, anal segment about as long as pygofer, narrow, sides straight, parallel.

In color similar to male but the infuscation at apex of M4 and 4*a* extending along M4 to basal infuscation.

Described from twenty-two males and eleven females from Siberut (H. H. K. September 1924) and Sipora (H. H. K. October 1924).

The type is from Sipora; there appears to be no difference between specimens from the two islands.

**Oliarus** Stål.

4. **Oliarus angusticeps** sp. nov.

Female: length 4.3 mm.; tegmen 5.4 mm.

Length of vertex nearly three times (2.8) the width between the basal angles; base angularly emarginate; areolets long and very narrow reaching to about the middle of vertex, the fork of medial frontal carina forming a small, oval area. Claval vein forking about middle of clavus, Cu fork slightly basad and Sc + R fork still slightly more basad. The hand tarsal joints with spines at apex. Pygofer much broader than long, ovipositor styles about as long as pygofer, flat, the anterior pair slightly lanceolate, the posterior pair wider and slightly longer with the apex narrowly rounded; anal segment large, wide, widest near base gradually narrowing to apex which is truncate.

Yellow or light brown; the mesonotum dark brown with slightly lighter carinae; abdomen dark brown lighter along posterior margins of stermites. Tegmina hyaline; a dark brown mark across middle of clavus, over base of Cu fork to R, a few dark marks near apex in apical cells, a dark mark at apex of costal cell, the cross veins and apical cross veins fuscous, stigma yellowish, Wings hyaline, veins brown, apical portion slightly fuscous.

Described from two females from Sipora (H. H. K. 31.x.1924).

**Myndus** Stål.

5. **Myndus dubius** sp. nov.

Female: length 2.7 mm.; tegmen 3 mm.

Length of vertex 1.4 times the width of base, base twice the width of apex, transerve carina about middle, very ill defined in some specimens. Median ocellus present, length of frons slightly greater than width. Pygofer longer than wide, with median longitudinal depression, ovipositor complete, slightly curved, a little longer than pygofer.

Brown; darker over vertex, frons, middle of clypeus, middle of mesonotum, abdomen and pygofer, the posterior margins of abdominal stermites lighter. Tegmina hyaline, slightly opaque, a brown mark from basal cell along Cu to apex of clavus where it branches off over nodal line to node then back over apical cross veins to apex of Cu1, a small dark mark at fork of claval veins and at apex of each apical vein. Wings hyaline, opaque with waxy secretion, veins brown at base lighter towards apex.

Described from seven females, six from Siberut (H. H. K. 10 and 26, ix, 1924) and one from Sipora (H. H. K. 30.x.1924).

**Bennaria** Melichar.

6. **Bennaria clarescens** (Walker)?

*Benna clarescens* Walker, 1857, Jour. Linn. Soc. Lond. Zool. 1, p. 158.

Three female specimens from Siberut which agree with Walker's descriptions. The type specimens were from Borneo, but the writer has a specimen from Singapore which he considers this species. An examination of males may show specific differences. (Two specimens C. B. K. and N. S., September 1924; one specimen H. H. K. 11.x.1924).

## MEENOPLIDAE.

**Nisia** Melichar.

7. **Nisia atrovenosa** (Leth).

Three females from Siberut (H. H. K. 7.ix.1924).

The type locality of this species is Nias Island so these females are likely to be this species. Unfortunately there is no male for comparison with specimens identified as this species from other localities. This species has been identified from various localities, some records being misidentifications.

## DELPHACIDAE.

**Ostama** Walker.

This genus was hitherto known by one species from Borneo represented in the British Museum by one specimen. This present species is nearly allied to *O. juncta* Walker, but in color is distinct. The spur is awl-shape, in transverse section triangular.

8. **Ostama junctissima** sp. nov. Figs. 5, 6.

Male: length 4.2 mm.; tegmen 5 mm.

Frons twice as long as wide, margins slightly arcuate widest on apical half, median carina obscure, showing indications of forking at middle, surface of frons rugulose. The cubitus forking at or near nodal line.

Brown; head, pronotum, mesonotum and abdomen dark brown, legs and pleura lighter reddish brown. The tegmina differs from *O. juncta* in having a large black patch in middle of corium with a light spot in middle and a light yellow or white patch between suture and first claval vein reaching from base to middle and a lighter and more obscure mark near apex of clavus.

Pygofer long ventrally short dorsally, anal emargination obscure, very shallow, no anal angles, ventral margin deeply emarginate; anal segment fairly large, no armature; aedeagus and genital styles figured. The aedeagus is of the Asiracinid type, the penis long, mostly membraneous with a long slender spine.

Female: length 4.6 mm.; tegmen 5.4 mm.

In build and color similar to male. The ovipositor projecting beyond end of pygofer.

Described from one male and four females; one male and two females from Sipora Island (C. B. K. and N. S., October 1924), one female from Siberut Island (H. H. K. September 1924) and one female from Pulau Tello, Batu Islands (H. H. K. November 1924).

**Malaxa** Melichar.

9. **Malaxa bispinata** sp. nov. Figs. 7, 8.

Male: length 1.2 mm.; tegmen 2.6 mm.

In general build typical of genus. Second segment of antenna more than twice the length of first.

Light brown or stramineous; basal half of frons dark brown extending on to genae beneath eyes; a dark brown transverse line on base of clypeus; a longitudinal dark mark on anterior side of antennae from base to apex. First and second tibiae brown, the coxae with a longitudinal brown mark, hind legs not so distinctly maked. Pronotum and mesonotum shiny light brown. Abdomen dark brown, lighter on ventral side.

Tegmina hyaline, costal cell yellowish, extending into radial cell, the margin from apex of costal cell to apex of tegmen fuscous extending on margin to apex of clavus; veins slightly stramineous. Wings hyaline with brownish veins.

Male genitalia figured.

Described from one male from Sipora (H. H. K. 25.x.1924).

This is a typical species with very distinct genitalia.

**Ugyops** Guer.

10. **Ugyops insularis** sp. nov. Figs. 9, 10.

Male: length 6.4 mm.; tegmen 7.7 mm.

Length of vertex in middle three times the width, the base on middle line being considerably anterior to middle of eyes, the lateral angles of base being carried back much further, the mediolateral carinae continued on to the frons as two separate carinae, gradually converging and meeting together near apex of frons. Antennae without longitudinal sulca on either segments. Sc + R and Cu forks about level, no stigma.

Stramineous; three longitudinal dark brown or black lines on frons, one on each side and one in the middle between the carinae, slightly fuscous between carinae on clypeus, fuscous between carinae of vertex, a longitudinal fuscous line on basal segment of antennae and the apical portion of the second segment dark. A

few small fuscous marks on medio-lateral portion of pronotum continuing on to the mesonotum, carinae of mesonotum dark; front and middle legs fuscous. Abdomen with small dark marks on stermites, less on tergites. Tegmina hyaline, small fuscous spots at apex of apical cells, running down to apical cross veins in the M 1 and 2 cells, veins alternate light and dark, granules small, bearing fine, fuscous macrotrichia. Wings hyaline with fuscous veins.

Genitalia figured.

Female similar to male. Ovipositor reaching to end of anal segment which is longer than broad.

Described from four males and one female. North Pagi Id. (H. H. K. 6.x.24), Siberut (H. H. K., 29.ix.24), Pulau Tello, Batu Ids. (H. H. K. xi, 1924), Siberut (C. B. K. and N. S., ix, 1924).

**Dicranotropis** Fieber.

11. **Dicranotropis insignis** sp. nov. Fig. 11.

Male: macropterous; length 2.0 mm.; tegmen 2.7 mm.

Median frontal carina forking between one third and one fourth from base; vertex slightly broader than long, carinae typical; antennae extending slightly beyond the base of clypeus, second segment nearly twice the length of first; lateral pronotal carinae diverging posteriorly, straight or very slightly curved, not reaching hind margin. Hind basitarsus about the same length as other two together, spur large, thin, subtectiform, with very many minute, black teeth on hind margin.

Genitalia figured; the medio-ventral margin produced into two small round projections.

Stramineous; carinae of head and thorax lighter than between the carinae; dorsum of abdomen and the greater part of pygofer, the genital styles and spine of anal segment darker brown.

Tegmina hyaline, slightly stramineous; apical veins brown slightly extending into membrane at apex; granules very small, sparse, dark. Wings hyaline, veins brown.

Described from one male from Siberut (H. H. K. 7.ix.1924).

This comes near to *D. fuscifrons*, but the genitalia are distinct.

**Peregrinus.**

12. **Peregrinus maidis** (Ashmead).

One specimen from Siberut (H. H. K., 7.ix.1924, No. 10).

**Sogata** Distant.

13. **Sogata 4-spinosa** Muir.

This was described from a macropterous male from Singapore. There is one macropterous male and one brachypterous female from Sipora (H. H. K., 25 and 27.ix.1924). The male is darker than the type, the median light line on frons, the vertex and the middle of pronotum and mesonotum being very distinct against the dark

brown or nearly black surroundings; the brown on tegmina is darker and the light area over apical Sc, R and M1 cells and the white commissure are more conspicuous.

In the brachypterous female the tegmina reach the middle of the eighth abdominal tergite. Dark brown, the apical portion of clypeus, the middle carina of frons, the vertex, the middle of the nota and a median line down abdominal dorsum nearly white, abdominal pleura and legs light; commissure of tegmina white.

## DERBIDAE.

### **Neocyclokara** Muir.

14. **Neocyclokara flaveola** sp. nov. Figs. 12, 13, 14.

Male: length 1.8 mm.; tegmen 4 mm.

The shoulder skeels are not quite so large as in *N. flava*, the genotype, *otherwise* it is quite typical.

Stramineous; legs lighter, abdomen reddish. Tegmina hyaline, slightly fuscous, veins reddish yellow. Wings hyaline, very slightly fuscous, veins light brown.

Male genitalia figured; anal segment roundly emarginate at apex; the inner margin of genital styles in ventral view produced on basal half, the outer margin with two small processes, one near base and the other about middle.

Described from one male from Siberut (H. H. K. 26.ix.1924).

This is close to the only other species of this genus, *flava*, from the Philippine Islands.

### **Goneokara** Muir.

15. **Goneokara pullum** Muir.

One female from Siberut (H. H. K., 8.ix.1924).

Previously known from Borneo and Mindanao.

### **Vekunta** Distant.

16. **Vekunta** sp.

One female specimen from Sipora (H. H. K., 2.xi.1924), closely related to *V. pseudobadia* Muir, of Java, but it differs in having the light mark at apex of costal cell much smaller and without a dark mark in its centre. It does not appear to be *V. nitida* (Bierm.) of Sumatra. Without a male I do not care to describe it as new.

### **Kamendaka** Distant.

17. **Kamendaka (Eosaccharissa) opacipennis** sp. nov. Fig. 15.

Male: length 2.3 mm.; tegmen 3.7 mm.

Head, pronotum and legs light stramineous, a spot on genae in front of eyes and base of clypeus fuscous, mesonotum fuscous brown, apex of rostrum and front tibiae fuscous; abdomen dark brown. Tegmina fuscous with darker veins, opaque with white powdery wax secretion; wings slightly fuscous with darker veins. The head, especially the lateral carinae of vertex, and thorax with white, powdery wax secretion.

The male genitalia figured, a distinguishing point is the large, medio-ventral process of pygofer.

Described from one male from Siberut (H .H. K., 3.x.1924).

18. **Kamendaka (Eosaccharissa) karnyi** sp. nov. Fig. 16.

Male: In size and colour similar to *K. opacipennis* but the mesonotum lighter, the tegmina darker with reddish veins. The male genitalia are very distinct.

One male specimen from Sipora (H. H. K., 1.xi.1924).

**Phantosmatocera** Kirkaldy.

19. **Phantosmatocera unopunctata** Muir.?

One female from Siberut (H. H. K., 24.ix.1924) which appears to be this species, hitherto only known from Amboina, but only the finding of the male will settle the correct identity of this specimen.

**Megatropis** Muir.

20. **Megatropis karnyi** sp. nov.

Male: length 4.6 mm ; tegmen 6.1 mm.

In profile head projecting considerably in front of eyes, the vertex and base of frons forming two distinct curves; the head distinctly narrower than thorax but the vertex quadrate, the apex about half the width of base; lateral carinae of vertex and frons very deep, not meeting together except at their edges on apical portion of frons. Antennae irregularly U shape, projecting slightly beyond head, both arms subequal in length, slightly swollen at base of inner arm. Clypeus with median carina, no laterals. Carinae of mesonotum very indistinct. Sc and R forking slightly before the middle of tegmen, Sc cell long, M arising from Sc + R, slightly beyond base; base of Cu sinuous, Cu 1 bent at right angle closing Cu cell.

Margins of pygofer entire, lateral margins straight; anal segment median size, sides deflexed, apex rounded, curved ventrad; dorsal surface excavate beyond anus which is near base; genital styles reaching slightly beyond anal segment, subacinacicate, the apex oblique, slightly sinuate, the apical outer angle slightly produced, rounded, a small curved spine on outer margin about middle.

Light stramineous; a red mark on side of head from eye to apex. Tegmina light stramineous, veins same color as membrane or lighter, ten distinct red spots on cells before the first median sector, one between Sc and R, two between R and M, three between M and Cu, two between forks of Cu 1, one between Cu and suture and one between the claval veins, the apical cells slightly reddish. A small black spot at apex of clavus. Wings slightly stramineous with light veins.

Described from one male from Sipora (H. H. K., 21.x.1924).

While the head is not quite so broad as the genotype yet it clearly belongs to this genus. The distinct reddish spots distinguish it from other species of the genus.

21. **Megatropis siberutensis** sp. nov.

Male: length 3.8 mm ; tegmen 6.1 mm.

Head slightly narrower than thorax; vertex quadrate, apex considerably narrower than base, lateral keels large, those of frons nearly meeting together at their edges. Antennae not quite reaching to apex of head, simple fairly stout, swollen at base but without prong.

Ventral margin of pygofer slightly rounded, lateral margins straight; anal segment fairly large, concave above convex below, apex rounded. Genital styles fairly narrow, margins subparallel, apex bluntly pointed and curved dorsad, a small angular projection from the middle of the inner margin.

Light yellow, with a white, waxy secretion over the greater portion; a light reddish mark over genae in front of eyes. Tegmina hyaline, opaquely white with waxy secretion, veins yellowish, yellowish over Cu area and along the margin of commissure.

Described from one male from Siberut (H. H. K., 11.ix.1924).

22. **Megatropis simplex** sp. nov.

Male: length 3.8 mm ; tegmen 5 mm.

Head narrower than thorax; vertex longer than broad, apex narrow, lateral carinae large; frons narrow with large lateral carinae which meet together along their outer margins. Antennae flat, thin, broad and fairly long, slightly thickened at the base but without any sign of a knob or prong. Sc + R forking about middle, M arising from near base of Sc + R, Cu forking slightly basad of Sc + R fork.

Light yellow; legs and sternites of abdomen lighter; tegmina hyaline, opaquely white, veins yellow, a small dark brown mark at apex of clavus with a very faint infuscation from that point to apex of Sc.

The genitalia are near to those of *M. karnyi* but the genital styles have not sinuous apices.

Female: length 2.8 mm ; tegmen 5.3 mm.

These agree with the male in colour and build but they have the antennae thick, terete and short, hardly reaching beyond the eye.

Described from one male and one female from Siberut (types) (H. H. K., 9.ix.1924) and two females from Sipora (H. H. K., 15.x.1924).

**Mysidioides** Matsumura.

23. **Mysidioides multimaculata** sp. nov.

Female: length 2 mm.; tegmen 4.3 mm.

Stramineous; dark brown on thorax behind eyes, the middle and lateral portions light, slightly fuscous on legs. Tegmina hyaline, slightly fuscous, veins alternately marked with small

white and black or fuscous marks, the dark marks after consisting of two short, longitudinal marks, the apical veins white. Wings hyaline, slightly fuscous with light brown veins.

Described from one female from Sipora (H. H. K. 31.x.1924)

The specimen is not in very good condition but the speckling of the veins is very distinctive and separates it from any other described species.

**Rhotana** Walker.

The genera *Rhotana* and *Levu* are difficult to keep apart on the characters at present recognised and unless others of greater generic value can be found they will have to be amalgamated. But among the species included in these two genera we find characters in the venation which may be of value for separating the species, either into groups within one genus or into two more genera. The arrangement of the first median sector and the cubitus as illustrated in *Rhotana latipennis* Walker (the genotype fig. 18) and *Levu matsumurai* Muir (= *Rhotana nitriceps* Matsumura, not Stål) is a case in point. At the time of describing *Levu* Kirkaldy did not recognise that Walker's figure was of *Rhotana* and not *Paricana*, had he done so it is possible that he would not have erected *Levu*.

24. **Rhotana bicolor** sp. nov. Fig. 17.

Male: length 3 mm ; tegmen 5.9 mm.

Carinae of frons meeting together on basal third, carinae of vertex also meeting together for the greater portion of their length; shoulder keels distinct but small. Arrangement of Ms 1 and Cu as in *R. latipennis* (Fig. 18). The triangular cell reaching to base of Ms 2, the forking of Sc + R and M about middle of the basal M cell.

Anal segment very small, apex rounded, entire; lateral margins of pygofer subangularly produced, ventral margin entire; genital styles considerably longer than broad; slightly narrowed on basal half, apex narrowly rounded.

Stramineous, sordid over pronotum and mesonotum, apex of abdomen reddish. Tegmina reddish brown from base to a little beyond apical cross veins, the apical portion white, veins in dark portion reddish, in white portion yellowish, the apical cross veins between Sc, R and M with the reddish extending into the membrane slightly, which area is bordered with darker brown, a very small semihyaline mark in R cell before apical cross vein. Wings hyaline slightly fuscous, with a dark mark in middle of the apical half.

Described from one male from Sipora (H. H. K., 2.xi.1924).

25. **Rhotana semiopalinus** sp. nov.

Male: length 2.7 mm ; tegmen 4.8 mm.

Carinae of apex of vertex and base of frons touching; shoulder keels small but distinct. Ms Ia touching Cu 1 for a short distance; triangular cell only reaching half way to Ms 2.

Stramineous, slightly fuscous over vertex, pronotum and mesonotum. Tegmina hyaline and opalescent over apical portion, reddish fuscous over basal portion, the latter extending to middle of costal cell and base of Ms 2 anteriorly and to a little beyond apical cross veins posteriorly, veins in dark portion red, in light portion yellowish, the apical cross veins between Sc and Ms 2 margined with fuscous. Wings fuscous with hyaline at apex, veins reddish brown.

Described from one male from Sipora (H. H. K., 11.x.1924).

**Acanthocera** Melichar.

26. **Acanthocera punctifrons** Mel.

One female specimen from Sipora (H. H. K., 12.x.1924) which is slightly darker than specimens from the Philippines but otherwise similar. It is difficult to separate this genus from *Pamendanga*.

**Pamendanga.**

27. **Pamendanga siporensis** sp. nov. Figs. 19, 20.

Female: length 4.3; tegmen 8.5; wing 3.7 mm.

In build and color this is so close to *P. fuscipennis* (Muir) that it can only be separated by the genitalia. In the latter the pregenital plate is angularly produced from sides to middle; in *P. siporensis* it is totally different and complex, best understood from figure.

Two females, one from Sipora (C. B. K. and N. S. October 1924) and one from Siberut (H. H. K., 15.ix.1924).

28. **Pamendanga rubicunda** sp. nov. Fig. 21.

Male: length 2.8; tegmen 6.7; wing 2.6 mm.

Typical of genus; genitalia figured; the anus near base of anal segment, beyond anus attenuate, apex pointed; inner margin of genital styles entire, apex bluntly pointed and turned inward slightly; medio-ventral margin of pygofer slightly, roundly produced.

Red; antennae, legs and thorax slightly yellowish, apex of proboscis and apex of middle tibiae fuscous. Tegmina fuscous, darker over costal, subcostal radial and basal and apical median cells, a series of seven whitish spots along costa commencing near middle, a larger light spot at apex of M, veins bright red; there are some fainter light marks in basal R and cells between median sectors. Wings slightly fuscous with darker reddish veins.

Described from one male from Sipora (C. B. K. and N. S., October 1924).

This species is close to *P. albicosta* (Muir) from Java and *P. antigobe* (Kirk) from Borneo, but the genitalia are distinct.

29. **Pamendanga diffusa** sp. nov. Figs. 22, 23.

Male: length 3.7; tegmen 12; wing 3.8 mm.

In build typical of the genus. The male genitalia figured; the anal segment has a large projection across the middle of the ventral side; the ventral margin of the pygofer is roundly produced.

Brown; lighter on clypeus and carinae of head, on pronotum behind eyes and dots, over carinae of mesonotum and on hind margin; abdomen darker brown with yellowish spots, the anal segment and sides of pygofer also light. Tegmina hyaline, marked with diffused brown or fuscous; a series of light spots in costal, subcostal and radial cells, veins brown diffusing into membrane, especially in apical half. Wings hyaline, slightly suffused with fuscous, veins brown.

Female; similar to the male in build and color. The subgenital plate figured.

Described from three males and three females from North Pagi Island (H. H K., 6 and 18.x.1924) and one from Sipora (H. H. K., 11.x.1924).

This species comes nearest to *P. platypes* (Muir).

**Zoraida** Kirkaldy.

30. **Zoraida sylvicola** Kirk.

One male from South Pagi Island (H. H. K. October 1924).

This species was formerly only known from Borneo.

31. **Zoraida (Peggiopsis) smedleyi** sp. nov. Fig. 24.

Female: length 2 mm.; tegmen 10.3; wing 4.4 mm.

Typical of the subgenus, the antennae distinctly flattened and sunken in the middle, eyes fairly large and prominent. Anal segment subturbinate in outline in dorsal view, slightly longer than broad, about equal in length to styles. Pregenital plate wider than long, hind margin gradually and roundly produced in middle with a small emargination in middle.

Stramineous; slightly darker over posterior portion of mesonotum and abdomen, darker brown along the hind margin of pregenital plate. Tegmina hyaline, costal, subcostal, radial cells and extending into basal median and around the bases of the median sectors, fuscous or sordid light brown; veins brown, lighter on the four at apex with a small dark spot at base of the light portion; cross veins dark extending slightly into the membrane especially at apical radial cross vein. Wings hyaline slightly fuscous, veins dark.

Described from one female from Siberut (C. B. K. and N. S., September 1924).

I have a female from Philippine Islands very close to this, but there is no emargination in the middle of the hind margin of the pregenital plate.

32. **Zoraida karnyi** sp. nov. Fig. 25.

Male: length 3.8 mm.; tegmen 9.6 mm.; wing 1.3 mm.

Antennae cylindrical or very slightly flattened longer than frons. Length of basal median cell about four times the width, basal sector furcate and appearing as part of Cu.

Anal angles of pygofer produced as long as genital styles, acute; anal segment small, not reaching to apex of anal angles, subparallel sided to near apex where it narrows, apex with minute angular emargination; medio-ventral process of pygofer subangular, apex rounded; genital styles narrow, curved inward on apical half, apices bluntly pointed, overlapping in middle line.

Stramineous; a dark spot on gena in front of antenna and another on the side of clypeus near base, abdomen yellowish, fuscous on hind margin of sixth and seventh tergites with some fuscous marks forming two broken medio-lateral lines; anal angles of pygofer and anal segment reddish, genital style and ventral portion of pygofer dark brown or black. Tegmina hyaline, Sc, R and M reddish, except at apex where they are darker, other veins brown, extending faintly into membrane at cross veins and bases of second and third sectors, three small dark spots near apex on R and two M veins; wings hyaline, sordid, veins light.

Described from one male from Siberut (H. H. K., 11.ix.1924).

This comes near to *Z. lankana* Dist. but the antennae are not quite so flattened.

33. **Zoraida padangensis** sp. nov.. Fig. 26.

Male: length 4.6 mm ; tegmen 11.5; wing 5.4 mm.

Antennae longer than frons, cylindrical, slightly enlarged towards apex, arista arising a little before apex. First median sector fuscate, appearing as part of cubitus, median basal cell large, length about seven times the width, five simple median sectors. Wings slightly less than half the length of tegmina.

Male genitalia closely related to *Z. cycnoptera* Dist. but the apex of anal segment is much more acute, the anal angles of pygofer more rounded and the genital styles broader and more rounded on apical half, both on outer and inner margins. Medioventral process gradually widening from base for a short distance then quickly narrowing to rounded apex.

Stramineous; a few lighter raised spots on pronotum, abdominal tergites dark brown with a light patch in middle of sixth and seventh; genitalia tinged with red. Tegmina hyaline; costal and subcostal cells with three or four fuscous marks in basal half, fuscous over apical half; radial cells fuscous with lighter dots which are larger in basal half, the dark fuscous extending out to base of second, third and fourth m.s.; basal median cell and extending to base of second sector light fuscous with lighter spots; Sc, R and M red, median sectors and rest of veins dark brown, cross veins with fuscous extending into membrane, a few light fuscous marks along side of the sectors and Cus and a slightly darker one at the apex of each Cu and sectors; three minute light spots at apex between veins and a dark minute one on veins slightly basad, the apical spot at apex of fourth sector larger than others. Wings hyaline, slightly fuscous, veins darker fuscous.

Described from one male from Padang, West Sumatra (C. B. K. and N. S. November 1924).

This comes near to *Z. cycnoptera* and *Z. melichari.*

**Pseudohelcita** Muir.

Hitherto this genus was represented by one species from New Guinea and Mysol.

34. **Pseudohelcita nitida** sp. nov. Figs. 27, 28, 29.

Male: length 4.6 mm.; tegmen 12 mm.; wing 1.3 mm.

In profile frons subconically produced in middle; no line of demarkation between frons and vertex, vertex widest at base gradually narrowing, frons narrow, subparallel sided to near apex where it suddenly widens, a faint suture along middle of vertex and frons to where it enlargens. Clypeus large, no median carina, lateral carina large. Antennae longer than frons, cylindrical, slightly enlarged about one third from apex where the arista is articulated, roughened all over with the sense organs.

The Sc and R joined as far as the apex of basal cell, beyond that point Sc cell very narrow and the Sc covered by the strongly convex R to near apex; R cell narrow to near apex where it slightly widens; basal cell broad. M with five sectors, the first or basal sector fuscate and appearing as part of Cu; the margin of clavus turned under to form the anal fold. Mesothorax without carinae but there are three longitudinal marks where carinae exist when present, the scutellum large. Genitalia figured.

Shiny, clypeus and genae dark brown, nearly black, frons and vertex lighter; first segment antenna yellow, second dark brown; pronotum dark brown with lateral and hind margins yellow which is broadest on lateral margins, in the middle the yellow marks run across to the anterior margins; mesonotum brown, the scutellum darkest, hind margin yellow, abdomen dark brown with lighter hind margins. Third and fourth sternites yellow; first and second coxae yellow, hind coxae brown, femora reddish brown, hind pair darkest, tibiae reddish brown with the apices light, fore tarsi dark, hind tarsi light. Tegmina clear hyaline; costal, subcostal and radial (except apical) cells dark, the base of costal and some data and a large dot in apical subcostal red; veins dark brown; wings brown.

Female; slightly larger but otherwise similar to male. Pregenital plate large, hind margin angularly produced from sides to middle; anal segment not so long as genital styles, gradually narrowing to apex which is rounded.

Described from one male and two females from Sipora all badly damaged (C. B. K. and N. S. October 1924).

**Proutista** Kirkaldy.

35. **Proutista moesta** (Westw.).

One female from Siberut Id. (C. B. K. and N. S. September 1924). One male and three females from Sipora Island (C. B. K.

and N. S., October 1924); two males from Sipora (H. H. K. October 1924).

This is one of the few widely distributed Derbidae. These specimens are slightly darker and larger than the Ceylon specimens, the white spots in costal cell are larger and there is no hyaline mark in apical cell between first and second median sectors.

**Zeugma** Westwood.

Six species of this genus were formerly recorded, one from India and the other five from Malaysia.

36. **Zeugma elegans** sp. nov. Figs. 30, 31.

Male: length 6 mm.; tegmen 13.3 mm.; wings 6.4 mm.

In build similar to the type of the genus (*vittata* Westw.); there is a distinct carina separating the vertex from the frons. The first median sector is fuscate and attached to the cubitus, apart from this there are ten simple median sectors.

The genitalia figured.

Light brown; a dark brown mark down middle of frons and clypeus, and across gena from eye to apex of frons, lateral carinae of frons and clypeus dark; a broad dark mark down middle of mesonotum, lighter in middle over median carina, a smaller mark on the lateral portions of the mesonotum; abdomen dark brown; tegmina hyaline, light brown with darker veins, fuscous over apical half, gradate cross veins fuscous, a darker mark near apex; a lighter mark across costal cell and base of subcostal, where the membrane is lighter the veins are red or yellowish. The wings hyaline, light fuscous with dark veins.

Described from one male from Sipora (H. H. K. October 1924).

This species is very distinct from *Z. corporaali* from Medan, Sumatra.

37. **Zeugma karnyi** sp. nov. Figs. 32, 33, 34.

Male: length 4.8 mm.; tegmen 9.2 mm.; wing 5 mm.

No distinct carina dividing frons from vertex; vertex and frons slightly narrower than in *Z. elegans*, no median frontal carina, middle of vertex and frons slightly tumescent and glabrous. Eight (on one tegmen seven) simple median sectors and the basal fuscate sector. Genitalia figured.

Stramineous; frons extending on to genae and middle of clypeus extending into sides red, middle of vertex, frons and, to a lesser extent, clypeus black; middle of pronotum and mesonotum darker brown, along the lateral carinae and near lateral margins of mesonotum a slightly darker line. Front and middle femora each with two longitudinal dark lines, hind femora with only slight indications of such lines. Tegmina hyaline, stramineous, slightly fuscous over apical median cells and apical Sc and R cells, a light yellow patch in middle of R; veins yellow or reddish, gradate cross veins of M fuscous extending into cells, also the bases of M

sectors extending into cells, a small dark mark over cross veins between R and M and M and M sector near apex, a dark round spot on basal cell; wings hyaline, slightly stramineous, veins brownish.

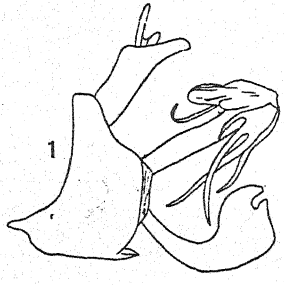
Female slightly larger but in color and build similar to male.

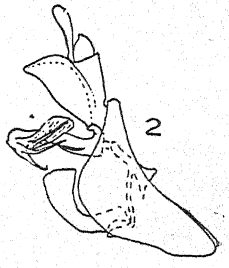
Described from one male and one female from Siberut (H. H. K. September 1924).

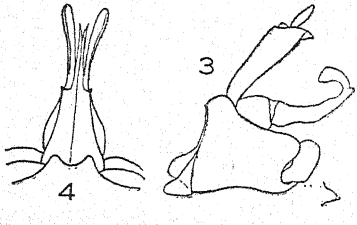
This is nearest to *Z. javana* Muir but it is quite distinct; the genitalia are quite distinct from *Z. corporaali.*

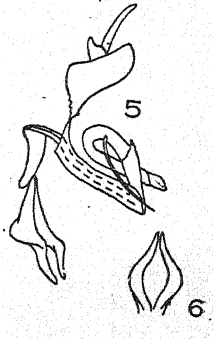
EXPLANATION OF FIGURES.

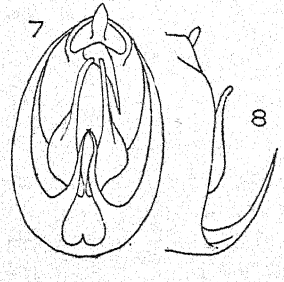
1. *Andes siberutensis,* lateral view of male genitalia.
2. *Kirbyana javana,* lateral view of male genitalia.
3. *Mnemosyne fuscinervis,* lateral view of male genitalia.
4. *Mnemosyne fuscinervis,* ventral view of ovipositor.
5. *Ostama junctissima,* lateral view of anal segment, aedeagus and genital styles.
6. *Ostama junctissima,* genital styles.
7. *Malaxa bispinata,* full view of male genitalia.
8. *Malaxa bispinata,* lateral view of male genitalia.
9. *Ugyops insularis,* ventral view of genitalia.
10. *Ugyops insularis,* apex of aedeagus.
11. *Dicranotropis insignis,* full view of male genitalia.
12. *Neocyclokara flaveola,* lateral view of genitalia.
13. *Neocyclokara flaveola,* inner margin of genitalia.
14. *Neocyclokara flaveola,* apex of anal segment.
15. *Kamendaka opacipennis,* lateral view of genitalia.
16. *Kamendaka karnyi,* lateral view of genitalia.
17. *Rhotana bicolor,* venation at base of tegmen.
18. *Rhotana latipennis,* venation at base of tegmen.
19. *Pamendanga siporensis,* lateral view of female genitalia.
20. *Pamendanga siporensis,* full view of female genitalia.
21. *Pamendanga rubicunda,* lateral view of male genitalia.
22. *Pamendanga diffusa,* lateral view of male genitalia.
23. *Pamendanga diffusa,* ventral view of female pregenital plate.
24. *Zoraida smedleyi,* basal half of tegmen.
25. *Zoraida karnyi,* basal half of tegmen.
26. *Zoraida padangensis,* lateral view of male genitalia.
27. *Pseudohelcita nitida,* lateral view of male genitalia.
28. *Pseudohelcita nitida,* lateral view of male genitalia.
29. *Pseudohelcita nitida,* lateral view of aedeagus.
30. *Zeugma elegans,* lateral view of male genitalia.
31. *Zeugma elegans,* dorsal view of anal segment.
32. *Zeugma karnyi,* lateral view of genitalia.
33. *Zeugma karnyi,* dorsal view of anal segment.
34. *Zeugma karnyi,* apex of genital styles.


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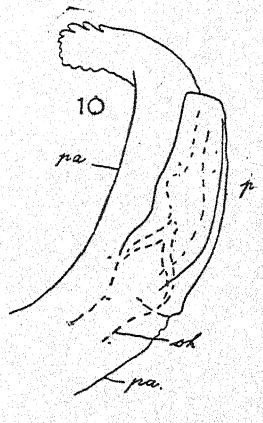

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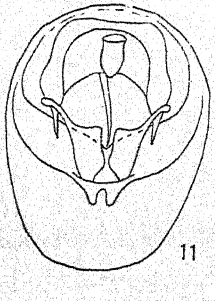

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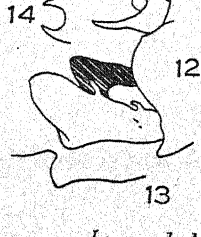

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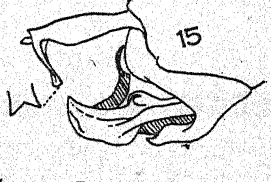

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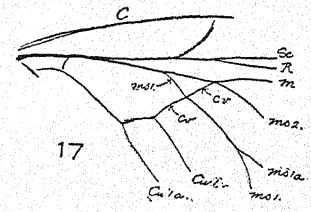

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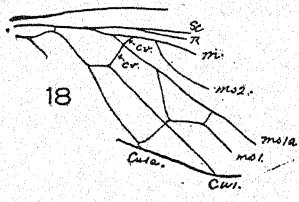

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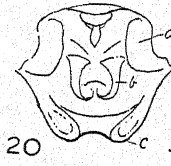

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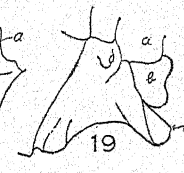
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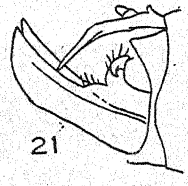
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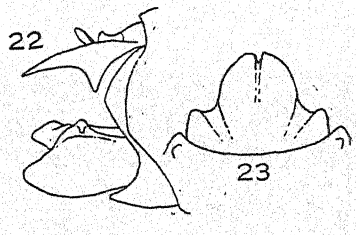


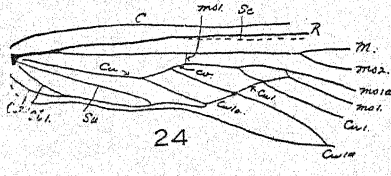
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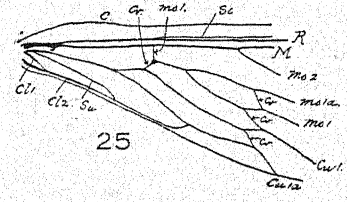
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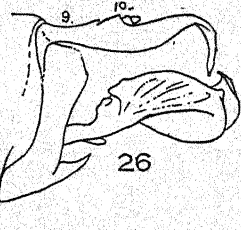

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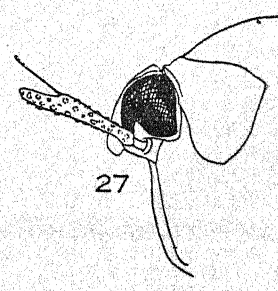
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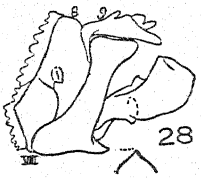


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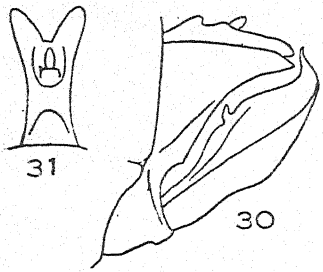


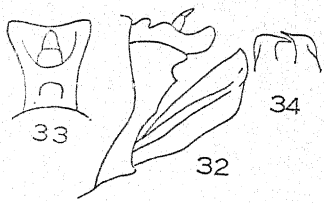
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# The founder of Malay royalty and his conquest of Saktimuna, the Serpent.

*By* R. O. WINSTEDT, C.M.G., D.LITT.

Authentic records show that a dynasty sprung from "a king of the mountains" ruled the old Sumatran kingdom of Palembang (or Sri Vijaya) from at least the VIIth to the XIVth century A.D., controlled Central Java as early as 778 A.D., claimed suzerainty over Western Java for 400 years and probably introduced Mahayana Buddhism there (JRASSB. No. 81, pp. 23-8). So great was this ancient Buddhist kingdom, that even the ruler of Muslim Minangkabau, which took Palembang's place after Hindu Java had destroyed it, is commonly described as one of the three great monarchs of the world along with the Sultan of Rome (= Byzantium) and the Emperor of China, all sons of Alexander the Great! (*Encyclopadie van Nederlandsch Oost-Indië* 1918, vol. II, p. 739: van der Toorn's *Tjindoer Mato,* Batavia, 1886, pp. 5, 68).

In the XVIIth century "Malay Annals" there is a story of a wandering "Kalinga" prince, a descendant of Alexander the Great, with the title of Bichitram Shah, the son of a Raja Suran who is recorded to have ravaged the west coast of the Malay Peninsula and was apparently an XIth century Chula king at enmity with Palembang.

In Shellabear's edition of the "Malay Annals" Bichitram Shah is dissatisfied because his father gives him the small kingdom of "Chandu-Kani," and he sets sail from India on a voyage of conquest but his fleet is scattered by a storm and nothing more is said of him. According to Dulaurier's text (*Collection des Principales Chroniques Malayes, vol. II* Paris, 1856, p. 35) Bichitram Shah accompanied by Nila Pahlawan, Kisna Pandita and Nila Uttama, came from heaven down to a mountain in Palembang, Bichitram Shah was given the title of Sang Sapurba, made ruler of the country and begat two sons Maniaka and Nila Kisna on Radin Sendari, daughter of Demang Giwanan ( گيوونن ) (*ib.* p. 54)—it would appear however that this text has dragged in a redundant Bichitram Shah not to leave him out of the story. Shellabear's text states that the three persons who descended on the Palembang hill were Nila Pahlawan, Krisna Pandita and Nila Uttama and that they were half-brothers of Bichitram Shah, their father being Raja Suran and their mother a princess from a kingdom in the depths of the sea. Nila Uttama is given the title of Sang Sapurba and begets Maniaka on a daughter of a Palembang aboriginal chief. His brothers marry Wan Empok and Wan Malini, the girls in whose rice-clearing the three princes had alighted.

Now the names Sapurba, Maniaka and Nila Uttama are corruptions of Suprabta, Menaka and Tilottama, three Apsaras, nymphs of Indra's heaven. And there is other Indian colouring in the incongruous legend. Nila Uttama descended in the Palembang hill rice-clearing on a white bull, from whose vomit emerged a bard with an Indian name who recited a Sanskrit coronation formula.* Again the Palembang mountain on which Sang Sapurba alighted from heaven was thereafter styled Mahameru, the Hindu name for the pivot of the universe, the abode of Vishnu and Indra; a detail that recalls how in Greece "the Olympian gods, wherever their worshippers moved, tended to dwell on the highest mountain in the neighbourhood and the mountain thereby became Olympus." Lastly while one of the two girl rice-planters bears a native name, Malini the name of the other seems to be Sanskrit, meaning "Garlanded."

The story continues that after wandering to Java, Borneo and Bentan, "Sang Sapurba" sailed to Minangkabau where the chiefs —one version mentions Pateh Suatang as their head—"waited respectfully on the raja and informed him that they considered his arrival as a signal piece of good fortune, and would be happy to appoint him raja, but that they were grievously harassed by an immense snake (Sakti-muna), which they wished he would oblige them by destroying, as it had resisted all their efforts either to cut or pierce without either being stunned or wounded. Sang Sapurba assented, and requested them to show him its den. Then a champion, named Permasku Mambang was sent by Sang Sapurba with his famous sword Chora Semandang Kini to perform this service.. As soon as the champion saw it lying with huge coils like a hillock, the snake saw him and put itself in motion, when the champion smote it with the sword and cut it into three parts..... In this combat the sword received one hundred and ninety notches." (Leyden's *Malay annals*, p. 39). According to this version Sang Sapurba was then made king of Minangkabau: according to another he had already been made king and was tested later over the snake.

The sword became one of the Minangkabau regalia and in the *Chindur Mato* is called Madang Giri. In the following interesting variant of the legend from the "Genealogy of the Rajas of Pulo Percha, from a MS. in the possession of the Sultan of Indrapura" (*Miscellanies*, Sumatran Mission Press, Bencoolen, 1822, vol. II) the kingdom of which the serpent's slayer is made ruler is Palembang or Langkapura and it is one of his descendants,

* This formula is still recited in Perak by the Dato' Sri Nara 'diraja, the lineal descendant of this bard (whose family may not eat beef) when wearing the ancient dragon-armlets of a Hindu prince a Sultan of Perak is installed. At the same time the real Hindu name of Sang Sapurba is whispered by the Dato' into his royal master's ear.

driven by Javanese of Mataram away from Palembang, who founds Pagar Ruyong and becomes ruler of Minangkabau. The name of the sword is given as *Chemundang Giri*, "Hewer of a mountain." This version runs:—

The king of Mogul Khyrun set out from his city of Sah ul Sayah, came to the country of the Brahmans and placed over it a Raja named Bacha Salegram Jawahir Sing, passed on to Hindustan and thence to Barapura, whence he sailed for Medan. At the end of six months he reached Nilapura and remained there three years. At last he sailed away for an island, Pulo Percha, "towards the left of the rising sun whence smoke issued as from a rock." "On the fourth morning he arrived and saw the waves breaking at the foot of that mountain and at a little distance what appeared to be an island, with a man standing upon it. The island appeared endeavouring to rise from the sea, but the man scattered the earth and prevented it, so that it again disappeared. Day by day the same was repeated..... The king then ordered the ship to be moved to that place, and, when he arrived, asked 'O thou, who stirrest up the waters who art thou?' The reply was, 'I am Sikatimuno.' The king asked, 'What is your employment?' and Sikatimuno replied, 'I am destroying this island that it may not become land.' Then the king drew forth his sword called Chemundang Giri, which destroyed of itself, and said, 'O Sikatimuno, now I will kill you.' He replied, 'Thou canst not kill me.' Sikatimuno was then destroyed by Chemundang Giri and the island of *Lunkapura* became land by the will of God. It became large and extended to the foot of the mountain. Thereafter the king landed on that island, called also Sa-guntang-guntang Penjaringan and situated between Palembang and Jambi." And he became its ruler.

More complete from the point of view of the folklorist a version of this widespread type of tale comes from Ujjain, the ancient capital of Malwa in western India. There once upon a time a demon vexed and devoured the people till the city was deserted. At last the demon consented to accept one victim a day, provided that the victim was allowed to exercise absolute sovereignty for the day. A caravan of merchants from Gujerat halted near the city. Vikramaditya, a grandson of Indra, was their servant. Understanding the language of beasts he heard the tale of the city's plight from a jackal. Next day he entered Ujjain, found a potter's son being forced into sovereignty, took his place and that night worsted the demon and was made ruler of the country. (Frazer's *Golden Bough, Part III, The Dying God, 3rd ed.*, pp. 122-3).

An important detail is that in nearly all the Malay versions the slayer of the snake is a descendant of Alexander the Great! This anachronistic detail comes from Muslim India.

A Sumatran legend from Lampong of the beginning of the XXth century relates how the great serpent Sakti-muna was slain

by a Muslim Saint (*Wali Allah*) from India, how its corpse became a hill near Palembang and how the saint settling beside it at last got the name of Raja Iskandar, that is, Prince Alexander. Palembang folklore places the grave of Alexander the Great on a hill said to be the sacred hill of the Sang Sapurba legend! (G. P. Rouffaer's *Was Malaka Emporium voor 1450 A.D. genaamd Malajoer*, pp. 470-1).

A popular religious account robs "Sang Sapurba" of credit for the snake's destruction and ascribes it to an archangel! For according to a Malay charm-book from Selangor, which was lent to Skeat "'the navel of the earth is the serpent Sakti-muna, who coils round the earth. And the word of God came secretly to Gabriel, 'Take the iron staff of the Creed that hangs by the gate of heaven and smite for me the serpent Sakti-muna.' And Gabriel smote the serpent in twain, so that its head shot against the sky and its tail penetrated the earth.

"Its tail became the Genie called Glory of the Universe (*Sri 'Alam*), its tongue the Wonder-working Genie (*Jin Sakti*), the seeds of its eyes White Genies, the hollow of its eyes Grandsire Siva (*Dato' Mentala Guru*), the irises of its eyes the Black, Green, Blue and Yellow Genies, and its life-breath the Raja of Genies. Its liver became the embryo of life, its eyes limes, the dirt of its eyes incense, the film of them cotton and its self became the Genie that makes the world revolve. Its intestines became the Genie who encircles the world, its heart the Genie who is the Herald of the World, the brightness of its jewel the genie that makes the world quiver, its voice lightning, the glitter of its sword sheet-lightning, and the hot breath of its sword the magic power of causing death by pointing, called after Raja Wana. Its sword became the rainbow, its blood the Yellow Spirit of Sunset, the glitter of its blood the Spirit of Light, and the heat of its blood became fire. Its spirit became wind, its liquid water, and the elements of its seed earth and iron; the hair on its body became grass, the hair of its head trees, its sweat dew. Again, the elements of its seed became rice and fish, and the blood of its navel became the poisonous *upas* tree.

From its tail that stuck in the earth sprang caul, after-birth, navel and the discharge before delivery, which cause all sickness. From their blood were created ghosts and spirits of the earth and from their souls all birth vampires." (*Malay Magic* pp. 582-3).

This is the crude popular pantheism that came from Muslim India. And the account ends by finding the attributes of that macrocosm the world in the microcosm, man. The Genie that is the Glory of the World is located in the human eye; the Genie that makes the world quiver in man's breath; the Genie that makes the world revolve in man's heart; and the Genie that is Herald of the World is the Muslim creed!

But what have Islam and the Angel Gabriel to do with Saktimuna? Muslim legend makes Jan, a serpent, the father of all genies. To the Malays, Jan was a great serpent from over the sea. Therefore Sakti-muna must have been another name for Jan and have been the father of all genies! The old-world Malay was quite happy "voyaging strange seas of thought, alone," with an eye blind to language frontiers and the lapse of centuries. So the Malay magician uses the invocation

*"Genies infidel and Muslim!*
*You and I are of one origin, both servants of Allah.*
*But ye are children of Sakti-muna*
*And I am descended from the Prophet Adam."*

(Winstedt's *Shaman, Saiva and Sufi* p. 95).
And because the sword of Sang Sapurba received one hundred and ninety notches, it must have hacked one hundred and ninety pieces off the father of all genies and created the Malay magician's favourite number of one hundred and ninety spirits! (*ib.* pp. 84, 171).

The vitality of the many-detailed Minangkabau legend is so remarkable a feature in Malay folklore, that it would seem it must have had some important historical basis. Just as it has telescoped late Muslim myth into Hindu myth from Minangkabau, so it may have telescoped earlier Palembang history into Minangkabau legend. Several layers may be detected, and several points deserve stress.

A prince, whose original name is changed on accession, descends *from the sky* in a rice-clearing in Palembang. His coming *improves the rice-crop.* And one account associates the spot with "the tomb of Alexander the Great," which if it ever had foundation in fact would certainly be a *megalith.* It is needless to dilate on the interest of these associated details to readers of Mr. Perry's book, "The Children of the Sun." The sky origin of the rulers of Minangkabau (who took the place of the earlier Palembang dynasty) is preserved also in customary sayings, which with the usual democratic spirit of that people invent a similar origin for their commoner chiefs:—

*When to earth a prince fell standing*
*And the first of chiefs fell pensive*
*And the first of tribal headmen*
*Fell in attitude of homage*

Or

*He the first king, king primaeval*
*Dropped he as the rain from heaven.....*
*White the blood that in him flowed*

(JRASSB. No. 78, pp. 8-11).—With regard to Mr. Perry's view that the diffusion of culture followed the track of gold and pearls, it may be noted that in the XVth and XVIIth centuries Minang-

kabau was famous for its gold trade (Marsden's *Sumatra* 1784. p. 268), and the king " received his taxes in gold by the bushel " (*ib.* p. 270).—

Sang Sapurba is also a scion on the distaff side of a house that came from under the sea and he adopts as child a princess born of river-foam. He marries 39 princesses who the next morning develope a skin disease on hands and feet. Lastly he marries, Wan Sendari, the daughter of the aboriginal headman of Palembang, called Chief Broad-Leaf. No ill results follow. Chief Broad-Leaf gives up his sovereignty and becomes Mangkubumi or Viceregent, the officer who acts for the ruler in his absence. Chief Broad-Leaf promises that his family will never show treachery to Sang Sapurba or his descendants, so long as they never put him or his descendants to shame.

Sakti-muna, of course, is a Sanskrit word and the legend of this snake must have come from India. There is one aspect of the story of value for historians which will have interest also for the " Diffusion " school of ethnologists. This may be seen from a paragraph (p. 275) in Mr. Perry's book:—

" Garuda the ruler of the birds, was the son of Vinata, whose sister Karma was the mother of the Nagas or serpents, the father of both sons being the sun. Although of the same parentage, and although allied to one another, a hostility existed between Garuda and the Nagas. Garuda was associated with the sky and the Nagas with the underworld. This brings to light further evidence that the rulers of the Dravidians were divided into two groups, one connected with the sky and one with the underworld, both related and yet hostile. This corresponds to the division of Egyptian society into sections connected with the sky and the underworld, combined with the hostility between the two gods, Horus and Set, connected respectively with birds, snakes and water animals."

Both a Water-Snake and a Garuda figure in the Solo (Java) regalia (Rouffaer *op. cit.* pp. 106-124). The Garuda was the symbol of Erlangga an XIth century Vishnuite warrior prince of East Java, and it is still the symbol of Hindu Bali. The Naga, it has been surmised by Dr. Rouffaer, was the symbol of Buddhist Langka (wherever that was), and therefore (I suggest) probably of Buddhist Palembang, in which case the slaying of Sakti-muna may be a myth symbolizing the conquest of Palembang by Java in the XIVth century.

As the rulers of Palembang had suzerainty over Kedah until ousted by Majapahit it is interesting to note that in the hotchpotch of myth at the beginning of the " Kedah Annals " the central fact is that the founder of Buddhist Langkasuka was invited to his throne after a contest with a Garuda. (JRASSB. No. 72, pp. 38-50).

The destruction of a country by a Garuda is found in the Sumatran folk-tale of Maalim Dewa, wherein a Raja from Java also assails the hero. (JRASSB. No. 85, pp. 58, 61).

Whether or not the victory over Sakti-muna symbolizes the conquest of Buddhist Palembang by Hindu Java, the snake at last becomes the Muslim Jan, the serpent in our story of Eve, expelled from heathen Minangkabau by the coming of Islam.

To-day in the art of Peninsular Malay Courts, which too often consists of designs in coloured paper, both Garuda and Nagas are favourite motives.

Other versions of the tale of Sang Sapurba will be found in Sir William Maxwell's paper "Aryan Mythology in Malay Traditions," (JRAS. vol. XIII, New Series, pp. 399-409) where the names of the three princes are given as Nijitram, Paldutani and Nila Asnam; and, again, in *Papers on Malay Subjects, Second Series,* No. 2, *Sri Menanti* by R. J. Wilkinson, C.M.G., pp. 7-10 (Kuala Lumpur 1914).

My references to Mr. Perry's book in this paper must not be taken to imply that I accept either his method or his conclusions. His guesses may be guesses at truth but his method is quite unscientific.

## Note on the word "Selaseh."

*By* H. OVERBECK.

In Malay Pantuns *selaseh*, the Malay name for the Basil-plant, is the usual rhyme-equivalent for *kĕkaseh*, "beloved" or "sweetheart." Is this merely due to the coincidence of the assonance, or is there perhaps an allusion to some belief connected with the plant? Quoting from various authors, Sir James Frazer in the "Golden Bough," (Part I, Vol. II. pag. 25) writes as follows:

"Another plant which figures as a bride in Hindu rites is the "Tulasi" or Holy Basil (*Ocymum sanctum*). It is a small shrub, not too big to be grown in a large flowerpot, and is often placed in rooms; indeed there is hardly a respectable Hindu family that does not possess one. In spite of its humble appearance, the shrub is pervaded by the essence of Vishnu and his wife Lakshmi, and is worshipped itself daily as a deity. The following prayer is often addressed to it: "I adore that *tulasi* in whose roots are all the sacred places of pilgrimage, in whose centre are all the deities, and in whose upper branches are all the Vedas." The plant is especially a woman's divinity, being regarded as an embodiment of Vishnu's wife Lakshmi, or of Rama's wife Sita, or of Krishna's wife Rukmini. Women worship it by walking round it and praying or offering flowers and rice to it. Now this sacred plant, as the embodiment of a goddess, is annually married to the god Krishna in every Hindu family. The ceremony takes place in the month Karttika or November. In Western India they often bring an idol of the youthful Krishna in a gorgeous palanquin, followed by a long train of attendants, to the house of a rich man, to be wedded to the Basil, and the festivities are celebrated with great pomp. Again, as the wife of Vishnu, the Holy Basil is married to the Salagrama, a black fossil ammonite which is regarded as an embodiment of Vishnu. In North-Western India this marriage of the plant to the fossil has to be performed before it is lawful to taste of the fruit of a new orchard. A man holding the fossil personates the bridegroom, and another holding the Basil represents the bride. After burning a sacrificial fire, the officiating Brahman puts the usual questions to the couple to be united. Bride and bridegroom walk six times round a small spot marked out in the centre of the orchard. Further, no well is considered lucky until the Salagrama has been solemnly wedded to the holy basil, which stands for the garden that the well is intended to water. The relations assemble; the owner of the garden represents the bridegroom, while a kinsman of his wife personates the bride. Gifts are given to the Brahman, a feast is held in the garden, and after that both garden and well may be used without danger. The same marriage of the sacred fossil to the sacred plant is celebrated

annually by the Rajah of Orchha at Ludhaura. A former Rajah used to spend a sum equal to about thirty thousands pounds, being one-fourth of his revenue, upon the ceremony. On one occasion over a hundred thousand people are said to have been present at the rite and to have been feasted at the expense of the Rajah. The procession consisted of eight elephants, twelve hundred camels and four thousand horses, all mounted and elegantly caparisoned. The most sumptuously decorated of the elephants carried the fossil god to pay his bridal visit to the little shrub goddess. On such an occasion all the rites of a regular marriage are performed, and afterwards the newly wedded couple are left to repose together in the temple till next year."

It would be interesting to know if remnants of this Hindu belief linger in the Malay mind. Indian influence came to the Malays through the "Klings," and J. A. Dubois, who lived among them, is one of the authors quoted by Frazer. Special mention of the *tulasi*-rites is made in his book "Hindu Manners, Customs and Ceremonies." (Translated by H. H. Beauchamp, C. I. E., 3rd ed., Oxford 1906, p. 649). A statement of the different things said of the *Sĕlaseh* in the first lines of Malay pantuns would be vague and valueless, but is there be any connection between the Hindu beliefs and the magic *Sĕlaseh* of the *Hikayat Malim Dewa?* In that tale the hero, when going to help one of his brides who is in distress through the act of a rejected lover, bids the magic parroquet stay behind and plant a white and a black *Sĕlaseh*. If the white fades, the hero will be in danger, and if the black fades, he will be dead. In that case the parroquet should fly to princess Nilam Chahaya and ask her for means to bring him back to life. The hero repeats the order to his trusty servant-maid, who is to take care of the plants. Twice in the course of the story the black basil fades, and twice the hero is restored to life by Princess Nilam Chahaya's aid.

But what connection could there be between the Hindu belief and the Malay expression *mabok bunga sèlaseh*, which signifies that a person is very drunk? Klinkert, who, like many Malay MSS., spells *sĕlaseh* without the final *h*, explains that it refers to the intoxication caused by the smell of the plant.

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## A Bee Bomor.

*By* J. D. GIMLETTE.

A swarm of light-brown honey-bees, rather smaller than their European allies (*A. indica*), once invaded my garden at Kota Baharu in Kelantan on a sultry day in April. They finally settled in the bungalow and swarmed strongly in the study, choosing the middle part of a narrow bookcase which had been made into a small cupboard. The cupboard contained books and papers; and in a very short time it was black with a large, unpleasant-looking mass of living bees.

An ever-increasing number of bees in the study led to the calling in of a Kelantan *bomor*. He arrived at dusk, full of dignity, solemnity and importance and was asked to disperse the bees. Approaching the bookcase, he opened the cupboard door wide and quietly sprinkled the swarm with a thin paste of rice-flour and water, and then steadily and stealthily stroking the bees with his bare hands drew them gently away from the books and papers: for a while it was easy to take the volumes and papers out of the bookcase, but the bees quickly returned to the corner of it where they were building their honey-comb.

The *bomor* next proceeded to perform a ceremony. Facing the East, and sitting cross-legged on the study floor, he put a tray in front of him containing several small bowls and plates, and a large bowl full of clear water. The small bowls and plates were filled with comestibles customarily offered to spirits by *bomor* who practise sorcery. One bowl contained a gold ring. The food consisted of bits of chicken, goat and buffalo, various kinds of cakes, some bananas, some parched rice and two kinds of boiled rice—white and yellow, dyed with turmeric. He sprinkled water and parched rice about the room and bowed his head in prayer; then rising, intoned some formula.

This ended, he directed me to bathe, change my clothes and appear before him; and concluded his performance by blowing with his breath about my person, at the same time pulling to pieces one or two slip-knots made of palm leaf tied in a bow. All was now supposed to be well between me and the bees. No promise was made, however, that they would leave the study on the morrow, as desired and understood.

During the next few days the swarm was as busy as ever. On being re-consulted, the *bomor* agreed at my request to remove the bees to a house occupied by a Malay servant in another part of the compound. He came at midnight, locked the bees in the cupboard of the bookcase, for the time being, and carried the whole thing unceremoniously outside. The bees deserted the compound in less than a fortnight leaving only a cupful of honey and about ½lb. of wax in the cupboard of the bookcase.

When bees come to a man's house by chance as it were, Kelantan Malays consider it a well-omened event, but it is unlucky to drive bees away from one house to another. Pahang Malays, on the other hand, consider their coming to be an ill omen; they say that the house will be deserted. In Pahang, the performance of a small ceremony is required to turn the luck: the ceremony (*mĕnyambut*) is in the form of a small feast with alms giving. W. E. Maxwell, quoted by Skeat, says that a swarm of bees settling near a house foreshadows misfortune. Shortly after the bees deserted my compound, a serious illness placed my life in jeopardy for some time. Was it because I dismissed the bees?

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